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SUMMARY OF RECENT ABSTRACTS *

III. MALARIA †

General

WILSON (p. 622) reports on the work of the East African Institute of Malaria and Vector-Borne Diseases for 1956–57, which included studies on dispersal of *Anopheles gambiae*, the effect of predators on the survival of its larvae and the oviposition of adults; on an insecticide campaign in the Pare mountains; on the parasite and spleen rates after application of dieldrin; and on the possible toxic hazard from dieldrin. He (p. 976) sums up his experience of malaria in East Africa, and comments on the different degrees of endemicity which exist there, quoting parasite rates in the youngest age-groups, reaching 92% at Jinja. He discusses the various types of trophozoites of *Plasmodium falciparum* found in blood smears, relating them to the severity of the attack and the immune status of the patient. East African strains do not respond readily to mepacrine, but the 4-aminoquinolines are very effective. The choice of treatment depends on the likelihood of reinfection and the presence or absence of premunition.

In Liberia MILLER (p. 974) observed the course of untreated malaria in African adults by examination on alternate days for 1 year and in children by daily examination for 71 consecutive days. *P. falciparum* predominated but *P. malariae* was also found, especially in children. Parasite counts in adults showed wide variation, but the clinical threshold, though also variable, was considerably lower in adults than in children; adults, however, were more efficient than children in keeping

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1958, v. 55. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on malaria in this series, see the March and April issues of the *Tropical Diseases Bulletin* each year since 1939.

down parasite levels, and suffered less from clinical attacks. There seem to be 2 different mechanisms in resistance, one tending to detoxify the products of the parasite responsible for the malarial paroxysm, and the other tending to suppress or eliminate the parasites themselves. The problem of gametogenesis is discussed.

SHUTE (p. 978) recalls some of the discoveries made at the malaria therapy centre at Horton since its inception in 1925. They include the demonstration of the failure of quinine as a prophylactic, the quotidian cycle of *P. vivax* in primary attacks, the pre-erythrocytic cycle of *P. vivax* and *P. falciparum*, the latency problem, the problem of strains, the confirmation of the validity of *P. ovale*, and the diagnostic character of the oöcyst in the 4 human parasites. In experimental work on therapeutic malaria SHUTE and MARYON (p. 367) found that *A. maculipennis atroparvus* may become infected when fed on patients before gametocytes are found in the blood, the earliest infection occurring 2 days after the onset of fever or parasitaemia. They suggest that gametocidal drugs should be given in malaria control schemes.

The gametogonic index is the gametocyte rate expressed as a percentage of the parasite rate, and SAUTET (p. 623) maintains that examples of the apparently spontaneous diminution of malaria are due to a decreased capacity of the parasite to produce gametocytes. The prospect of continued artificial regression of malaria is poor when the gametogonic index is high, and *vice versa*. There is little evidence in the literature of actual eradication of malaria; it may be reduced to very low levels but the residual infection is a potential source of later epidemics. Persistence of infection is probably due to the untouched exophilic section of the anopheline population. But if the gametogonic index is low the chance of epidemic outbreak is also slight.

BRUCE-CHWATT (p. 1301) defines the amended Parasite Density Index.

Epidemiology

Malaria increased in Poland during the war but the incidence has now fallen sharply. JANICKI *et al.* (p. 124) note that the early cases in the year are due to *P. vivax* with a long incubation period, and the later cases to *P. vivax* with a short incubation period, and these occur mainly in epidemic years.

In part of Afghanistan malaria is seasonal and is transmitted by *A. superpictus*; FISCHER and STEINHART (p. 6) found *A. stephensi* and *A. hyrcanus* also, but apparently they are not vectors there. In part of Baluchistan bordering on Iran RAFI *et al.* (p. 5) surveyed an area where malaria is seasonal with spleen rates up to 57% and where the vectors are *A. fluviatilis* and *A. culicifacies*.

HALAWANI and SHAWARBY (p. 861) give an account of malaria in Egypt, mentioning in detail the two vectors *A. pharoensis* and *A. sergenti*. Control has largely been achieved by drainage and the use of insecticides

in special campaigns, and the authors quote the eradication of *A. sergenti* from 2 oases and reduction in others. The value of drugs in control is emphasized, and a general eradication programme largely based on drugs, with restricted insecticide spray, is advocated.

Bray (p. 625) discusses the status of *P. vivax* in Africans. In general they are relatively insusceptible to it, and in a large part of West Africa where there is no large reservoir of susceptible people (in contrast to East Africa where there are many Indians) this parasite cannot maintain itself. He (p. 625) found *P. ovale* in 4·4–10% of people of all ages in parts of Liberia, and details the criteria on which the diagnosis was made. The clinical effect of this infection is usually slight in that area. In Somalia Moise (p. 247) also observed that *P. ovale* infection usually ran a mild course with spontaneous recovery.

The French Cameroons comprises humid forest zones, mountainous areas, savannah and semi-arid desert, but Languillon (p. 365) shows that malaria (especially *P. falciparum*) is common throughout except for a few areas. The vectors are *A. moucheti* and *A. nili* (humid forest), *A. gambiae* and *A. funestus*.

Matson (p. 125) shows that malaria was absent from the Nandi plateau of Kenya before the war of 1914–18, but that the forest was later cut, which probably altered the cold wet climate and facilitated the introduction of *A. gambiae* and *A. funestus*, since when epidemic malaria has recurred annually.

The Malaria Advisory Board of Malaya, in its report for 1956 (p. 726), recognizes that malaria is still a serious problem, and recommends the creation of an organization suitable for coordinating a country-wide scheme aimed at eradication of the disease. Malaria was reported to be virtually absent in part of North Perak, Malaya, but Griffith *et al.* (p. 624) found a parasite rate of 7%, and showed that *A. barbirostris* was the vector; it also probably carries *Wuchereria bancrofti*.

A survey of coastal and inland areas of the Western District of Papua, where there is an enormous low-lying marshy area with a sparse population, revealed a state of hyperendemicity with considerable immunity. Peters (p. 1073) found *A. bancrofti*, *A. farauti* and intermediate forms of the *A. punctulatus* complex. In this sparse population control by residual insecticides may prove difficult, and chemoprophylaxis may be needed.

Black (p. 242) comments on the effect on the malaria situation of increased movement of people in the South-West Pacific, partly as a result of pacification and partly in search of employment. It has led to many epidemics not only in the malarious areas but also in the migrants' home countries after their return.

After the war over 5 million people were repatriated to Japan, and many of them had had malaria and suffered later relapse. Potential vectors exist there, but even *A. hyrcanus sinensis* is not a powerful

carrier, and partly for that reason, according to SAWADA (p. 856), the disease is dying out in spite of the occurrence of indigenous cases.

Much of Venezuela has been freed of malaria, but GABALDÓN *et al.* (p. 367) report 2 outbreaks in the free areas which originated in infection introduced from still infected parts. The authors think that they were due to failure to observe the rules for regular application of insecticides.

The main endemic areas of malaria in Argentina are below an altitude of 1,750 metres, but BEJARANO (p. 978) shows that the vector, *A. pseudopunctipennis*, may breed higher than that.

Transmission

SAUTET (p. 627) many years ago recognized exophilic groups in various populations of anophelines, and thinks that they may be found in all parts of the world. Exophily may be accompanied by anthropophily, and it is by no means negligible in the maintenance of residual malaria.

HEDEEN (p. 126) has unexpectedly found *A. algeriensis* in western France.

SANDULESCO and MAROTINESCO (p. 729) identify females of the *A. maculipennis* complex before oviposition by removing mature eggs by dissection and examining them. KALMIKOV (p. 368) reports that colonies of *A. maculipennis* are constantly appearing and disappearing in southern and central regions of European Russia, and this leads to outbreaks of malaria when carriers of parasites come into contact with them. ŁUKASIAK (p. 728) describes the breeding of *A. m. messeae* and *A. m. maculipennis* in reservoirs in and around Warsaw. A study of *A. maculipennis messeae* and *A. m. maculipennis* in the Province of Leningrad was carried out by SUKHOMLINOVA (p. 368), who investigated the survival of overwintering females and the activity of succeeding generations. Some of the overwintering females lived to complete 6 gonotrophic cycles, but most of them died before malaria parasites could have completed development in them. *A. maculipennis labranchiae* is the chief vector in Morocco, and has been regarded as strictly anthropophilic, but an investigation by HOUEL (pp. 243, 480) showed that most specimens (84%) contained animal blood, even when taken in human habitations.

In 1949 *A. sacharovi* was found breeding throughout almost the whole of Israel, but by 1956 it had been limited to the Huleh swamps and (rarely) the Jordan valley; SALITERNIK (p. 242) attributes this improvement to DDT, swamp drainage and control of vegetation in fish ponds by herbicides. *A. sergenti* and *A. superpictus* are also found in these areas.

ZANINA (p. 369) considers that *A. superpictus* is the most important vector of *P. vivax* and *P. falciparum* in Rushan, Western Pamir.

A. gambiae is fairly common on the south coast of Cape Verde peninsula, and adults have been taken in Dakar. LARIVIÈRE and ABONNENC (p. 1282) also found *A. pharoensis*, *A. coustani ziemanni* and *A. rufipes*.

In Gambia BERTRAM *et al.* (p. 857) found *A. gambiae* and *A. melas*, which were numerous in houses and showed high rates for human blood. *A. funestus* was rare in the lower reaches of the river but may be more prevalent in the upper freshwater part. Various other anophelines were found.

MUIRHEAD-THOMSON (p. 479) has compared the oöcysts of *P. malariae* in *Anopheles gambiae* with those of *P. falciparum*. *P. malariae* develops more slowly, and he suggests that for ease of identification wild-caught anophelines could be kept 8–9 days before dissection, to allow the *P. falciparum* oöcysts to reach maturity; *P. malariae* oöcysts would be immature at that stage and would show the *malariae* type of pigment. He (p. 480) tested the infectivity to *A. gambiae* of a group of Africans in Liberia, and found it to be low at all ages; he comments that the number of anophelines infected, rather than the number of oöcysts produced, is the epidemiologically important factor.

In coastal Liberia *A. gambiae* feeds readily in the open and does not need to enter houses: the numbers are reduced in the dry season. Fox (p. 244) found 3·9% of midguts and 2·9% of salivary glands positive, most of the oöcysts being *P. falciparum* with a few *P. malariae* and *P. ovale* but no *P. vivax*. He (p. 977) reports a survey of man-biting mosquitoes (including anophelines) along the coast of Liberia. *A. gambiae* is perennial but *A. melas* is common only for half the year, being scarce after the start of the heavy rains. *A. funestus* is rare, possibly as a result of residual insecticide spraying.

MOUCHET and GARIOU (p. 245) examined the behaviour of *A. gambiae* in the French Cameroons. Exophagous *A. gambiae* are probably also exophilous, and this ensures continuation of the species in spite of residual insecticides. Some endophagous strains are also exophilous, leaving the houses within 12 hours after feeding, but the endophagous strains which are endophilous stay longer indoors. Only human blood was found in females taken outside.

TOUMANOFF (p. 1198) describes the breeding places of *A. gambiae* and *A. melas* in Lower Guinea, where human blood was identified in 93–100%. In two villages sporozoites were found in 2·1% and 4% respectively. *A. coustani* and *A. obscurus* were also captured indoors.

BRUCE-CHWATT (p. 5) shows that in part of South-Eastern Nigeria where water shortage caused the people to store water in large pots, *A. gambiae* has adapted itself to breeding in these unusual sites, thus demonstrating its capacity for varied behaviour and its dependence on man.

LEWIS (p. 729) gives an account of mosquitoes of the Blue Nile in the Sudan, where the river is interrupted by the Sennar dam. *A. gambiae* does not breed much in the reservoir above the dam, but does so in pools and irrigation channels, and in basins formed in rivers by the growth of *Acacia arabica*. Other anophelines include *A. pharoensis* and *A. rufipes*.

GILLIES (p. 6) studied the biting cycle of *A. gambiae* in Tanganyika. In experimental huts most of them bit after midnight, but there was not much difference between young and old females in their times of activity.

Malaria parasite rates have been reduced to very low figures in the suburbs of Lourenço Marques, but although vector anophelines have almost disappeared from houses PEREIRA (p. 977) has found some resting out of doors.

SERVICE and OGUAMAH (p. 858) have succeeded in establishing colonies of *A. funestus* in Nigeria and London and describe their technique.

GILLIES (p. 1074) describes a new subspecies (*erepeus*) of *A. wellcomei* which must be suspected as a vector in the Pare area of Tanganyika.

BROUWER (p. 858) reports an extensive investigation of the odour differences in human beings as a cause of differences in attractiveness to *A. stephensi*, which were always slight.

The National Society of India for Malaria and Other Mosquito-borne Diseases (p. 369) gives an account of the vectors in India, which occupies a substantial monograph in which the species are treated individually by various authors. WATTAL (p. 7) has summed up the biology of *A. jeyporiensis* and *A. j. candidiensis*.

LAIRD (p. 859) reports an extensive study of mosquitoes and the other forms of life in their habitats in the South Pacific, including parasites and commensals associated with the larvae. He discusses the factors which may affect the distribution of anophelines in the island groups, especially the islands that are free from them though lying in groups which are infested. Various local features such as absence of surface water or the fact that water is covered with weed, may account for this. The monograph covers other mosquito genera also.

In a study of the habits of *A. aquasalis* in Trinidad OMARDEEN *et al.* (p. 370) found that it feeds largely on bovines and to a lesser extent on other domestic animals; human blood was found in 6% of a large series examined.

BELLAMY (p. 1199) has been able to separate *A. perplexens*, as a valid species, from the synonymy of *punctipennis* with which it has been confused.

In Mexico *A. albimanus* prefers to remain in houses with tall thatched roofs, and HECHT and CORZO (p. 246) comment that this throws doubt on the value of using DDT on the lower part of the walls only, though this may be useful against *A. vestitipennis* which rests lower down. *A. pseudopunctipennis pseudopunctipennis*, in the hot coastal area, also prefers to rest in high thatched roofs. Studies of the habits of adult *A. albimanus*, *A. pseudopunctipennis* and *A. vestitipennis* in Mexico are reported by HECHT and HERNÁNDEZ CORZO (p. 1199); details should be sought in the original.

ARAGÃO (p. 1302) describes the distribution of the sub-genus *Kerteszia* in Brazil and its relationship to temperature and rainfall.

Aetiology

Bray (p. 614) has written a comprehensive monograph on the exo-erythrocytic cycle in the genus *Plasmodium* in which the history of the subject is recounted, present information exhaustively summarized, and some new work included. It is an invaluable contribution which brings together much information which has hitherto been scattered.

The same author, working in Liberia, has been successful in infecting chimpanzees with several species of the malaria parasites of man. He (p. 11) describes the blood infections and the liver stages of *P. vivax* in chimpanzees inoculated with sporozoites of the Madagascar strain. He also (p. 864) gives a description of the sporogonous cycle and mosquito transmission of *P. vivax schwetzi* from a chimpanzee, which he regards as a subspecies of *P. vivax* rather than as a distinct species.

He (p. 253) successfully infected chimpanzees by inoculation of sporozoites of *P. ovale* derived from a laboratory strain of *A. gambiae*, and mosquitoes could readily acquire the infection from the animals. He describes the liver stages, and the experiments indicate that the chimpanzee possesses partial resistance to the erythrocytic stages, but not to the pre-erythrocytic stages.

He (p. 865) prefers to place *P. falciparum* in a separate genus—*Laverania*—defining this on the basis of the absence of exo-erythrocytic (as opposed to pre-erythrocytic) forms. He succeeded in infecting chimpanzees with sporozoites of this parasite, and describes the pre-erythrocytic forms.

Jeffery (p. 625) has been able to preserve blood forms of human malaria parasites alive at −70°C. for 2 years, and sporozoites of *P. vivax* for 958 days.

Wolcott *et al.* (p. 624) have studied the position of various species of *Plasmodium* with relation to red cells, and conclude that they are intracellular, and that "appliqué forms" are artifacts.

Teriteanu *et al.* (p. 1073) examined a strain of *P. vivax* from Korea, comparing it with Rumanian strains. Certain minor differences in behaviour were found, but there was cross-resistance between the strains.

Diagnosis: Clinical Features

Restrepo and Echavarría (p. 246) take 5 cc. of blood and incubate it with an anticoagulant for 1 hour, centrifuge it and then remove the layer of leucocytes and count the proportion of granulocytes and monocytes which have ingested red cells, parasites or pigment. The method can be used for diagnosis or for control of treatment, and it is claimed to be more effective than a thick blood film. Using malaria parasites of monkeys Misra and Ray (p. 481) have found that a concentration technique in which 0·5 ml. blood with 10 ml. 1% acetic acid is centrifuged and the parasite layer stained gives almost 50% more positive results

than the usual thick film, and they therefore advocate that technique for diagnosis.

HENRY (p. 861) refers to his own melano-flocculation test which, he contends, is useful for diagnosing apyrexial cases, for checking treatment, for detecting chronic malaria in blood donors and in certain tropical diseases, and in medico-legal work. EYSSERIC *et al.* (p. 126) used the Henry test for malaria in France, finding it more specific than other tests for protein lability, though not invariably positive in malaria.

In studies of the serum proteins in malaria FIORILLO *et al.* (p. 1074) found reduction in albumin and increase in globulin, especially gamma globulin.

BASCOULERGUE (p. 8) found enlarged livers in up to 50% of children examined in French Equatorial Africa; there was no clear relationship with malnutrition, and schistosomiasis does not exist there. On the other hand there was a clear relationship with spleen and parasite rates, and the author therefore attributes this enlargement to malaria. In comment Waddy supports this view. A study of enlargement of the liver in Formosa indicates that it is related to the past incidence of malaria in that it was common where the spleen rate was high, and *vice versa*, and also in that liver size was proportional to spleen and parasite rates; HSIEH (p. 366), however, comments that as liver enlargement is often due to other causes, it cannot be used as an index of malarial endemicity.

ALLISON (p. 7) sums up the arguments relating to malaria and carriers of the sickle-cell trait. These carriers are as easily infected with *P. falciparum* as normal persons, but their parasite counts tend to be low, which suggests that haemoglobin S interferes with the multiplication of parasites, leading to low parasitaemia and relatively low death rates. This protection against malaria in sickle-cell trait carriers may explain the high incidence of the trait in some tropical regions. VANDEPITTE and DELAISSE (p. 727) discuss sicklaemia and malaria in the Belgian Congo, where they found the sickle-cell trait more frequently in control children than in those with malaria parasites, especially when account was taken only of infants with more than 1,000 parasites per cmm. Malaria mortality was closely related to the number of parasites, and both are relatively low in the sicklers. They, like Allison, think that this reduced mortality from malaria is responsible for the maintenance of the high sickling frequency observed. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

LUPAŞCU, G., AGAVRILOAIEI, A. & COSTIN, P. Problema malariei în bazinul hidrografic Timiș-Bega. [**The Problem of Malaria in the Timiș-Bega Hydrographic Zone**] *Microbiol., Parazitol. şi Epidemiol.* Bucharest. 1958, Jan.–Feb., v. 3, No. 1, 77–87, 3 maps on folding pl.

PETERS, W., CHRISTIAN, S. H. & JAMESON, J. L. **Malaria in the Highlands of Papua and New Guinea.** *Med. J. Australia.* 1958, Sept. 27, v. 2, No. 13, 409–16, 3 figs. [24 refs.]

The high mountain ranges of Papua and New Guinea are about 1,500 miles long, they range up to 15,400 feet in height and constitute a considerable part of the island. The lowlands are malarious and the highlands are on the whole free, and regulations which control the employment of highland labourers in the low country place the dividing line at 3,500 feet. There are, however, several records of epidemics at greater heights, of 4,500 and 5,000 feet [see SPENCER *et al.*, this *Bulletin*, 1957, v. 54, 1045] and the present authors summarize the information on spleen and parasite rates found in high altitude surveys made by themselves and by previous workers. Though most of the parasite rates are low they have in some cases been material—6, 10 and even 17% at an altitude of over 5,000 feet. The anopheline fauna of the highlands includes *Anopheles annulipes*, *A. punctulatus punctulatus*, *A. farauti*, intermediate forms between these last two, *A. bancrofti bancrofti* and *A. papuensis*. A sporozoite rate of 1·1% has been recorded for *A. farauti* [locality not stated], and *A. punctulatus* and the intermediate forms are also known transmitters, occurring up to altitudes of 6,000 feet.

There are many factors which might lead to a wider extension of malaria. Development and the opening of industry stimulate migration and the production of breeding places suitable for these pool-breeding species, with the consequence that further extension of malaria is to be feared and this is likely to occur in the form of epidemics of unstable malaria. Control measures are already applied to man in the form of quarantine, medical checking, and routine treatment with anti-malarial drugs of labourers returning from the lowlands to the highlands, and some improvement could be made in the present mechanism. Greater attention should also be given to the avoidance of man-made malaria in all new projects, but there is perhaps little importance in altering the present definition of the upper level of malaria in the

regulations, because most people coming from greater altitudes require some form of special protection such as the regulations are designed to give. *G. Macdonald*

RIOUX, J. A., SICART, M. & RUFFIÉ, J. Étude cytogénétique des Anophèles du "complexe" *maculipennis* dans le sud de la France. [**Cytogenetic Study of the** *Anopheles maculipennis* **Complex in the South of France**] *C.R. Soc. Biol.* 1958, v. 152, No. 1, 181–2.

Cytological studies of the salivary gland chromosomes were applied on the basis of Frizzi's work [this *Bulletin*, 1954, v. 51, 454], to members of the *Anopheles maculipennis* complex in the south of France. Provisional results indicate the existence of the following biotypes: *subalpinus*, not hitherto recorded in France; *atroparvus*, found near Toulouse, which would explain past outbreaks of malaria in the Haut-Languedoc region, no vector having been previously known. The biotype *maculipennis* s.str. is common in the "*Sous-Bassin aquitain*", being found in a variety of breeding sites and in towns. *E. R. Nye*

CHRISTIE, M. **Improved Collection of Anopheline Eggs and Analysis of Oviposition Behaviour in** *A. gambiae*. *J. Trop. Med. & Hyg.* 1958, Nov., v. 61, No. 11, 282–6, 4 figs.

Four line drawings illustrate the description of a new method of collecting anopheline eggs which has been tried, on an experimental scale, for *Anopheles gambiae* in East Africa. Basically, it is an artificial pool consisting of a set of trays of soil—the bottoms of the soil trays being of 16-mesh plastic gauze—resting, to give a depression of soil 18–20″ square, within a metal box. This box is linked *via* a cistern to a reservoir of egg-free water; water to fill the box and its soil pool to a suitable level is controlled by a ball-cock. When eggs are to be collected, water is removed largely by baling out the cistern. Eggs are stranded on the soil of the artificial pool as it empties to the cistern through the pipe in the lower aspect of the metal box. There is a good deal of detailed text, with illustrations, of how the soil trays are next removed and immersed in clean water and the floating debris (and any eggs) siphoned off into a suitable container. All this is done at the site of the pool but the container may now be taken to where the debris can be scanned at leisure for eggs under a microscope. In three field tests of the efficiency of the technique 60%, 62% and 69% of eggs were recovered of, respectively, 561, 615 and 344 eggs counted into such pools. Wild *A. gambiae* accepted the pools in three tests, the number of eggs per pool being 373, 392 and 579.

There is a brief section at the end which indicates how eggs can be differentiated:— empty egg cases, non-viable eggs, and eggs laid during the night or the preceding night. For this it is important to observe in

the laboratory the hatching details of the collections. It is thought that 70% of eggs initially viable survive the collecting and counting methods involved.

D. S. Bertram

GILLIES, M. T. **A Modified Technique for the Age-Grading of Populations of** *Anopheles gambiae*. *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 261–73, 4 figs. on 2 pls. [28 refs.]

The various methods suggested by different authors for determining and comparing the ages of mosquito populations, such as by measurements of the ampullae [this *Bulletin*, 1933, v. 30, 304; 1955, v. 52, 1047], by qualitative changes in the female genital tract [*ibid.*, 1958, v. 55, 713], by estimating the percentage in the pre-gravid state [*ibid.*, 1954, v. 51, 1032; 1956, v. 53, 276], by infection rates [*ibid.*, 1954, v. 51, 1032], by recognition of mating plugs [*ibid.*, 1957, v. 54, 919], or by the presence of parasitic mites [*ibid.*, 1958, v. 55, 105], are discussed. In an addendum to the paper, examination of the ovarioles [*ibid.*, 1958, v. 55, 713] is also mentioned. It is suggested in the addendum that a combined technique should be carried out, by dissection in normal saline, in the following stages: (1) plug recognition, (2) qualitative diagnosis by the changes in the oviducts and ampullae, and (3) examination of the ovarioles in all females in which a mating plug is absent and in which the ampullary characters are not at once obvious.

The first two stages in dissection are described with reference to populations of *Anopheles gambiae* in Tanganyika and, by these methods, it has been possible to distinguish three age-groups: (1) those females taking blood for the first time; (2) those taking their second blood meal, having not yet laid eggs; and (3) those that have already laid eggs at least once. By release and recapture experiments, with mosquitoes marked with spots of poster paint, the three groups were found to correspond to true ages of 1–2 days, 2–3 days and 4 or more days, respectively. The average daily mortality can then be calculated by the formula—

$$p^2 = \frac{\text{percentage of population in group 3}}{\text{percentage in groups 2 + 3}}$$

assuming a two-day interval between blood meals [*ibid.*, 1953, v. 50, 903] [where p^n is the chance of survival for n days, and the percentage daily mortality is $100(1-p)$; see *ibid.*, 1952, v. 49, 569]. By these methods the population of *A. gambiae* inland, in the Pare District of Tanganyika, has been shown to have a reduced longevity (a daily mortality of 13–15%), compared with a coastal population (a daily mortality of 7–8%). Recent work on the survival of *A. maculipennis* in Russia has indicated decreased survival of the older age-groups and, as the author comments, the technique described here is of limited value for estimating the average mortality rate for the whole population, although

it is valuable when calculating the effectiveness of control programmes, where the mortality induced by the insecticide will presumably not vary from one age-group to another. The addendum to the paper, recording methods for estimating the age of the older mosquitoes, mentions work already described by the author in this *Bulletin*, 1958, v. 55, 713.

B. R. Laurence

CLYDE, D. F. & SHUTE, G. T. **Selective Feeding Habits of Anophelines amongst Africans of Different Ages.** *Amer. J. Trop. Med. & Hyg.* 1958, Sept., v. 7, No. 5, 543–5.

On the basis of the findings of previous workers [MUIRHEAD-THOMSON, this *Bulletin*, 1951, v. 48, 704, and MUIRHEAD-THOMSON and MERCIER, *ibid.*, 1953, v. 50, 376] that age of the human victims influenced the attack rate of mosquitoes, the authors investigated the feeding habits of *Anopheles gambiae* and *funestus* in this respect in Tanganyika.

In 26 night catches a total of 695 fed mosquitoes were caught from huts containing 3, 4 or 5 Africans. Correlation of the differential leucocyte count [*ibid.*, 1955, v. 52, 434] of hosts and mosquito stomach contents allowed identification of the victim in each case.

In this series no consistent preference for people of a particular age-group was found.

E. R. Nye

SEN, P. **Importance of Albuminoid Ammonia and Salinity in the breeding of *Anopheles sundaicus* (Rodenw.).** *Indian J. Pub. Health.* 1957, Oct., v. 1, No. 4, 252–3.

1. "From a series of observations on the physico-chemical factors related to the breeding of *Anopheles sundaicus* in the environs of Calcutta, albuminoid ammonia only showed positive correlation with the breeding of the mosquito. The breeding of the species takes place only when this content gets reduced compared to the figures obtained both before and after breeding.

2. "There was some indication that free ammonia content of the breeding places increased slightly during the actual breeding of *sundaicus*. The figure obtained was always much lower than 1 part per million.

3. "Sodium chloride content of *sundaicus* breeding places although it varied considerably within a wide range indicated that the salt content in brackish water breeding places having salt content of a low order regularly increased during the breeding of the species."

YAMASAKI, T., IO, S., TANASE, Y. & HAYASHIDA, M. [**A Case infected with Malaria from Preserved Blood transfused**] *Med. J. Mutual Aid Ass.* 1958, Feb., v. 7, No. 1, 74–8, 1 fig. [11 refs.] [In Japanese.] English summary (9 lines), pp. 14–15.

Di Perri, T. Recidiva malarica a distanza. [**Relapsing Malaria after a Long Interval**] *Giorn. di Malattie Infettive e Parassit.* 1958, Oct., v. 10, No. 10, 928–30, 1 chart. [29 refs.]

A case of *Plasmodium malariae* relapse after 16 years soon after a transfusion of blood free of parasites.

Gunaratna, L. F. **Changing Concepts in Malaria Control.** *Ceylon Med. J.* (n.s.) 1958, May, v. 4, No. 3, 211–21. [Numerous refs.]

Mansurov, M. N. & Zufarov, T. Z. [**Eradication of Malaria in the Komsomolsk District of the Samarkand Region and Measures to prevent the Formation of New Foci of the Disease**] *Med. Parasit. & Parasitic Dis.* Moscow. 1958, v. 27, No. 5, 581–3. [In Russian.]

The English summary appended to the paper is as follows:—

"The Komsomolsk district was considered to be the most affected by benign tertian and malignant tertian malaria in the Samarkand Region. The presence of stable endemic foci was associated with the rice fields. The abundance of the larvae of Anopheles reached as much as 5000 per sq. m.

"The rate (per 10000) of malaria in individual collective farms attained 1147 (1938), 4275 (1941) and for the district as a whole 857–1402 (1946–1950). In some villages the parasite rate attained 18·8, the spleen rate 74·0 and Ross index 4·8. In some collective farms the sickrate was equal to 100%.

"Considering the high number of Anopheles the application of drugs alone did not prove to be effective in the sanitation of the foci.

"Five years (1951–1955) of complex application both of therapeutic and chemoprophylactic measures and elimination of A. m. sacharovi (by the use of DDT and hexachlorane) assured complete eradication of all the foci in 119 populated areas of the district. Malignant tertian malaria was eradicated in 1953 as a result of the use, since 1951, of bigumal. Since June 1955 and up to November 1957, no cases of malaria were registered in the district."

Davidson, G. & Pollard, D. G. **Effect of Simulated Field Deposits of Gamma-BHC and Dieldrin on Susceptible, Hybrid and Resistant Strains of *Anopheles gambiae*, Giles.** [Correspondence.] *Nature.* 1958, Sept. 13, v. 182, 739–40.

An investigation has been made into the effect of simulated field applications of commercial formulations of gamma BHC and dieldrin on

susceptible, hybrid and resistant strains of *Anopheles gambiae*. The mosquitoes were exposed to blocks of highly sorptive mud 3 in. in diameter and ½ in. thick, sprayed either with gamma BHC at 25 or 50 mgm./sq. ft., or dieldrin at 50 mgm./sq. ft. (50% dispersible powders).

The test method was similar to that employed by HADAWAY (*Pesticides Abstracts and News Summary*, 1958, v. 4, 81). Approximately 20 unfed mosquitoes were introduced into a Perspex chamber placed vertically over the treated surface. There they were exposed for periods of 30 minutes to 7 hours according to the age of the residue. When susceptible *A. gambiae* were exposed for half an hour, all 3 formulations gave very high mortalities up to 2 months after treatment of the mud blocks. After 13 weeks, gamma BHC at 50 mgm./sq. ft. and dieldrin continued to give high kills, though the lower dosage of gamma BHC gave a reduced mortality of 40%.

Gamma BHC was more effective than dieldrin in killing the hybrids. Half-hour exposures to the high dosage of gamma BHC continued to give complete kills up to 2 weeks after treatment. The resistant mosquitoes were never satisfactorily killed by dieldrin. On the other hand gamma BHC of both dosages gave high kills at quite low exposure times when fresh.

While it is admitted that this method of exposure in a small space may give rise to artificially high mortalities, it is concluded that the "results indicate that a persistent kill of hybrid *A. gambiae* by gamma-BHC with a consequent delay in the appearance of the resistant strain may be expected when this insecticide is used".

The prospect of preventing the onset of resistance in anophelines by the use of a mixture of DDT and gamma BHC is discussed.

R. J. Wood

JONES, J. C. **Anaesthesia and the Action of DDT on** *Anopheles* **Larvae.** [Correspondence.] *Nature*. 1958, Sept. 13, v. 182, 722–3.

It is demonstrated that DDT has markedly less effect on early fourth stage larvae of *Anopheles quadrimaculatus* when they have been anaesthetized with ether or carbon dioxide immediately before testing. Both anaesthetized and non-treated batches of 1-hour-old fourth stage larvae were placed for 10 minutes in very high concentrations of DDT (1:10,000, 1% acetone). After exposure they were washed and placed in observation beakers containing food and water. The still anaesthetized larvae were orientated at the air-water interface with fine cardboard tips.

Ether, which gives the deeper and more prolonged anaesthesia, was more effective than carbon dioxide in interfering with the action of DDT. Possible explanations for this phenomenon are discussed.

R. J. Wood

SUNDARARAMAN, S. **The Behaviour of** *A. sundaicus* **Rodenwaldt in relation to the Application of Residual Insecticides in Tjilatjap, Indonesia.** *Indian J. Malariology.* 1958, June, v. 12, No. 2, 129–56, 1 map & 3 graphs. [10 refs.]

This paper reports mainly, but not exclusively, on entomological aspects of malaria control since residual spraying began in mid-Java in 1952 under the joint sponsorship of the Indonesian Government and the World Health Organization. The work dealt with in the present paper was carried out mainly on the south coast along a 120 kilometre strip (east from Tjilatjap) about 6 kilometres wide [see also this *Bulletin*, 1959, v. 56, 7]; the population is essentially rural, and their houses are mainly of wood or bamboo with palm leaf or grass roofs. Cattle are either tethered out-of-doors or merely sheltered in sheds with roofs but otherwise open on all sides.

Control was directed against *Anopheles sundaicus*, the principal vector; *A. subpictus* was a secondary carrier in parts. Details are given of the sprayings with DDT at 2 gm./sq. metre from 1952 to 1955. Despite the annual DDT treatments there has been, from malariometric data given, some increase in spleen rates. Parasite rates, although lower, are not notably more so than a decline elsewhere in unsprayed areas. Infant infections and mosquito infection have continued after even 3 years of DDT-spraying. That is, control with DDT was not successful. In view of these findings dieldrin was first used in one zone during 1955 and exclusively in 1956 as a substitute for DDT.

Important facts about mosquito catches may be summarized as follows. In an unsprayed area 4,887 *A. sundaicus* were taken in houses by day, and these were in window-traps or resting on the walls in the proportions, respectively, of 18% and 82%. Night-time studies indoors in the unsprayed area showed that of 1,410 females taken indoors 48·3% were on human bait and 51·7% resting on the walls. It is concluded from this and other findings than *A. sundaicus* is normally highly anthropophilic, endophagous, and largely, although not solely, endophilic in habit. (In normal, unsprayed, conditions *A. sundaicus* (1,482 specimens) was found resting outdoors in rock crevices, hollows in sand-banks, bushes and "other types" of resting site. Of 492 tested regarding their blood meal, about 22% had fed on man, and ox was a frequent host. In other tests by Mr. Weitz of the Lister Institute on 496 females taken gorged in houses, the anthropophilic index was 72%, ox was the next preferred host and pig, fowl and a few mixed meals accounted for 9 other mosquitoes.)

In a DDT-sprayed area (sprayed once each year from 1952 to 1954), the total day catches in houses were 338 females, of which 92·2% were in window-traps (examined 6.0 a.m.) and 7·8% at rest on walls. Night catches indoors were 1,110 females, of which 91·9% were taken on the human bait and only 8·1% at rest on the walls. It is concluded that

there is both irritation on contact with DDT, exciting mosquitoes to leave the house (many thus being taken in the exit window-traps) and a change of behaviour so that although mosquitoes still enter to feed in large numbers many also tend to avoid DDT surfaces and leave the premises unaffected. A particularly interesting point bearing on this problem is that when dieldrin was substituted for DDT, night catches indoors of 795 females were distributed as 92% on human bait and 8·0% resting on walls. This resembles what happened with DDT. (In another area dieldrin, as the only insecticide to be used, reduced night biting on human bait indoors and resting on walls to virtually nil for 7 months.) From this and other relevant data, including the fact that *A. sundaicus* is not physiologically resistant to DDT along the *south* coast of mid-Java, it is suggested that the mosquito population of the long-treated areas has, over the few years of selection through DDT contact, become increasingly composed of mosquitoes which inherently do not tend to rest on indoor walls. They are thus capable of continuing in high densities as an anthropophilic, endophagous, but more exophilic population than that which existed before DDT was brought into use. [Elsewhere (see Brown, *ibid.*, 1958, v. 55, 953), other workers point out that the mosquitoes in the houses treated with DDT, and finally with dieldrin, may still be showing contact repellence to DDT which is not completely masked by the dieldrin deposit. It seems to the abstracter that observations in a freshly built house left untreated in the treated area would clarify this issue.]

Control in the areas in which this behaviour effect has developed seems to depend on drugs for some years, in the hope that the mosquito population will revert towards its former composition and be susceptible to control by dieldrin; or larval control, or the (impracticable) policy of night space-sprayings with pyrethrum, may be necessary.

There are 18 tables of data, 3 graphs, and a map of the experimental area to illustrate the text. *D. S. Bertram*

See also p. 282, Bouisset *et al.*, Survie des trypanosomes et des hématozoaires dans le sang citraté et glucosé conservé en glacière. [**Survival of Trypanosomes and Plasmodia in Blood kept in a Refrigerator**]

Devakul, K. & Maegraith, B. G. **Blood Sugar and Tissue Glycogen in Infections in *Macaca mulatta* with the Nuri Strain of *Plasmodium knowlesi*.** *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 366–75, 2 figs.

Changes in blood sugar and liver glycogen concentration occurring during the course of *Plasmodium knowlesi* infection in monkeys have been reported [this *Bulletin*, 1940, v. 37, 509; Singh *et al.*, *Indian J. Malariology*, 1956, v. 10, 101]. In the present investigation, of similar

type, on the Nuri strain of the parasite the erythrocytic counts, stage of the parasitic life cycle and general condition of the host were considered when carrying out the estimations. The values for blood sugar during infection are shown in a table and indicate a fall which becomes very marked when death is approaching. There was no definite correlation between blood sugar values and the number of erythrocytes, degree of parasitaemia or stage of infection. In sugar tolerance tests it was established that the shape of the curve depended on the stage of infection. There did not appear to be any relationship between the onset of coma and the degree of hypoglycaemia in the monkey host. The liver and muscle glycogen values were very low in animals dying of the infection and were raised by intravenous injection of large amounts of glucose, so that glycogenesis was apparently not at fault. When steroids [*ibid.*, 1957, v. 54, 1392] were given along with glucose, the glycogen values of livers reached higher levels than when glucose was given alone. Calculation indicated that there may be competition between host and parasite for available glucose. *J. D. Fulton*

DEMINA, N. A. [**The Study of Immunity to** *P. berghei*. **Report II. The Mechanism of Transmission of Immunity to** *P. berghei* **from Immune Rats to their Offspring**] *Med. Parasit. & Parasitic Dis.* Moscow. 1958, v. 27, No. 3, 319–29. [Numerous refs.] [In Russian.] English summary.

This communication deals with immunity to infection with *Plasmodium berghei* and its mechanism in the offspring of immune female rats which had recovered from the infection, and describes further studies on the natural resistance of rats to infection with this parasite.

In the experiments, in which the rats were inoculated subcutaneously and intraperitoneally with varying numbers of parasites, the following facts were established: (1) transmission of acquired immunity from mother rats to their offspring takes place through the placenta and through the milk; (2) there is a direct correlation between the degree of immunity in the offspring and that in their mothers; (3) the immunity transmitted to the offspring is retained by them for 3½–4 weeks after birth; (4) during the period of immunity acquired from the mother, the offspring possess a mechanism whereby parasites are destroyed and the development of an inapparent infection, which might lead to active immunity, is prevented; (5) the results obtained with *P. berghei* throw light on observations in human malaria, which indicate that infants born from mothers who are resistant to local strains of the parasites, are immune to the given type of infection during the first 2 months of their life; (6) repeated unsuccessful attempts to infect female rats, that were resistant to *P. berghei*, had no effect upon the susceptibility of their offspring: this depended upon whether their mothers were susceptible or resistant after labour; (7) adult rats which were resistant to infection

possessed the same protective mechanism as immune new-born rats (see 4, above).

[For Part I, see this *Bulletin*, 1958, v. 55, 867.] *C. A. Hoare*

TRAGER, W. **Folinic Acid and Non-Dialyzable Materials in the Nutrition of Malaria Parasites.** *J. Exper. Med.* 1958, Nov. 1, v. 108, No. 5, 753–72, 2 figs. on pl. [19 refs.]

The malaria parasite *Plasmodium lophurae* has been shown to develop *in vitro* for 3 days in absence of the host red cell [this *Bulletin*, 1953, v. 50, 195; 1958, v. 55, 375] and some progress has been made in determining the factors responsible. The present work is concerned with this problem.

The conditions for maintaining a strain of parasite and for freeing it from the host red cell have been described in the earlier papers. Details are now given of the composition of the culture medium [*ibid.*, 1955, v. 52, 1146], including a method of fractionating duck red cell extract by electrophoresis on starch. The effect of folinic acid (Leucovorin) on the survival of *P. lophurae* and *P. falciparum* in culture was observed. Extracts of yeast of protein nature, although causing some reduction in *p*H of cultures, had in some cases a beneficial effect on the extracellular forms of the parasite. By electrophoresis on starch of duck erythrocyte extract, a fraction other than haemoglobin was obtained, which aided growth. Whereas for certain malaria parasites growing in culture within red cells folic acid was beneficial, this was not so when they were maintained extracellularly. On the other hand folinic acid had a favourable effect *in vitro* on these extracellular forms. Thus when growing outside red cells *P. lophurae* appears to require non-dialysable growth factors of high molecular weight, which occur in duck red cell extract as well as in the protein component of yeast. *J. D. Fulton*

LAIRD, M. & LARI, F. A. **Observations on *Plasmodium circumflexum* Kikuth and *P. vaughani* Novy and MacNeal from East Pakistan.** *J. Parasitology.* 1958, Apr., v. 44, No. 2, 136–52, 48 figs. on 2 pls. [Numerous refs.]

Blood films of 262 birds from the Sylhet district of East Pakistan were examined and 22 (belonging to 6 species) were found to harbour parasites. No parasites were found in 94 house sparrows, and only *Haemoproteus* and *Plasmodium* were present among the "positive" birds. This paper deals with the latter, of which *P. circumflexum* and *P. vaughani* were identified. *P. circumflexum* was found in 4 common Indian mynahs and in 5 grey-headed mynahs, and was successfully inoculated into clean mynahs and doves, though sparrows, pigeons, ducks and fowls proved insusceptible. The diagnosis of species was based chiefly on the synchronicity of schizogony (with 14 instead of the usual 20 merozoites),

invasion of immature corpuscles, merozoites with one end pointed, the other round, and gametocytes completely encircling the nucleus of the host cell. *P. vaughani* was found in these two mynahs also (9 times); it proved insusceptible to sparrows. The identification was made on the small size of the parasite, which has 4–8 merozoites and elongate gametocytes, with invasion of erythroblasts. An interesting discussion follows on the specific criteria for avian malaria parasites, many of which may have to be placed eventually in lower taxae. *P. C. C. Garnham*

McGhee, R. B. **The Reproductive Behavior of** *Plasmodium cathemerium* **in Duck and Chick Embryos.** *J. Parasitology.* 1958, Apr., v. 44, No. 2, 153–60, 3 figs. [15 refs.]

Plasmodium cathemerium ($3H_2$ strain) was adapted to 14-day-old duck embryos by rapid passage from an infection in canaries; by the twentieth passage the average parasitaemia was 10,000 parasites per 10,000 corpuscles. A day after infection, a synchronous development of schizonts became apparent, in that as many as 36% of the parasites were undergoing segmentation at the peak; this regularity was then lost and periodicity of the infection disappeared, while the parasitaemia itself declined. The average number of merozoites remained constant. An attempt was then made to establish *P. cathemerium* in chick embryos of 10 days' age; inoculation of infected canary blood proved useless, and even inoculation of duck embryo blood only gave rise to fleeting parasitaemia, which was not improved by subsequent passages. (Infections of *P. gallinaceum*, *P. lophurae* and *P. circumflexum* were easily induced in duck embryos by a similar technique.) *P. C. C. Garnham*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Bezon, A. & Ducasse, P. Caractères généraux et particuliers de la grippe asiatique en milieu d'endémie trypanosomienne (Abengourou, Côte d'Ivoire). [**General and Particular Features of Asian Influenza in an Endemic Area of Trypanosomiasis**] *Méd. Trop.* Marseilles. 1958, Sept.–Oct., v. 18, No. 5, 806–10.

Attention has already [this *Bulletin*, 1958, v. 55, 1207] been directed to the special severity of influenza when acquired by patients suffering from trypanosomiasis. In this paper, which concerns the same epidemic

in the same town, there are some further observations. In particular, of 6 patients admitted to hospital with an encephalitic or encephalo-meningitic form of influenza 5 were shown to harbour trypanosomes in the peripheral blood, and one of these 5 also yielded parasites in the cerebrospinal fluid. The sixth patient turned out to be an old case of sleeping sickness believed to have been stabilized by treatment. The authors emphasize the activating, or synergic, neurological effect of influenza infection on trypanosomiasis whether the latter has been treated with the arsenicals or not. *A. R. D. Adams*

RAINAUT, J., LINHARD, J. & SILVERIE, R. La fiche réticulo-endothéliale dans les trypanosomiases humaines africaines d'infestation et d'inoculation thérapeutique. [**The "Fiche Réticulo-endothéliale" in Human African Trypanosomiasis, naturally and artificially acquired**] *Méd. Afrique Noire.* Dakar. 1958, Oct. 1–15, v. 5, No. 19, 437–40.

The authors have employed a serum protein lability test called "*Fiche* [index] *réticulo-endothéliale*" (FRE) which is a modification of that described by SANDOR in which globulins are precipitated at varying *p*H and the result is presented diagrammatically. By this test an abnormal euglobulin has been shown to appear in the early stages of trypanosomiasis. The present study demonstrates that the test can be used to show the effect of treatment. Within 2 weeks of beginning of treatment with Lomidine or a combination of Lomidine with tryparsamide the abnormal euglobulin disappears and the FRE begins to change, to be fully normal again within 6–8 weeks after the beginning of treatment. *H. Lehmann*

GRIFFITHS, B. L. **The Colloidal Gum Mastic Reaction in Experimental Trypanosomiasis.** *J. Med. Lab. Technol.* 1958, Oct., v. 15, No. 4, 275–9, 1 fig.

CUTTING's colloidal gum mastic reaction (KOLMER *et al.*, *Approved Laboratory Technic.* 5th edition. 1952. New York: Appleton-Century-Crofts, Inc.) depends on the precipitation of mastic from a colloidal suspension by body fluids such as cerebrospinal fluid or plasma in which the proportions of globulin and albumin are altered. The method has been used in the diagnosis of trypanosomiasis and was applied under standard conditions. It was established in preliminary tests that various uninfected animals gave negative results and those which were infected gave positive results. The precipitation reactions with the serum of rabbits infected with *T. brucei* and *T. rhodesiense* were followed over a period of 90 days and comparison made with the serum of another rabbit which had been injected with egg albumin. Sheep infected with *T. brucei* were also used and a control animal received blood alone. The results of infection with polymorphic trypanosomes differed greatly from

those in animals which received blood alone or egg albumin. The reaction may be of value in diagnosis. *J. D. Fulton*

THURSTON, June P. **The Effect of Immune Sera on the Respiration of** *Trypanosoma brucei in vitro*. *Parasitology*. 1958, Nov., v. 48, Nos. 3/4, 463–7, 2 figs.

4 sera were tested in 4 dilutions against an homologous strain of *Trypanosoma brucei*, the method of test was basically that of DESOWITZ (*Nature*, 1956, v. 177, 132) in which the inhibitory action of the serum against O_2 consumption of trypanosomes was measured manometrically. The author concludes that this method is less sensitive as a measure of antibody activity than the neutralization test of SOLTYS [this *Bulletin*, 1958, v. 55, 739]. *W. E. Ormerod*

WRAGG, W. R., WASHBOURN, K., BROWN, K. N. & HILL, J. **Metamidium: a New Trypanocidal Drug.** [Correspondence.] *Nature*. 1958, Oct. 11, v. 182, 1005–6.

This new drug was found to have considerable potentiality as a curative and prophylactic agent against *Trypanosoma congolense* in laboratory and field trials.

BAUER, F. Über den Wirkungsmechanismus des Berenil (4,4′-Diamidino-diazoaminobenzol) bei *Trypanosoma congolense*. [**The Mode of Action of Berenil (4,4′-Diamidino-Diazoaminobenzol) on** *Trypanosoma congolense*] *Zent. f. Bakt.* I. Abt. Orig. 1958, v. 172, Nos. 7/8, 605–20, 8 figs. [27 refs.]

Berenil (4:4′-diamidino diazoaminobenzol) is active in trypanosome and *Babesia* infections. The present report deals with its mode of action against *T. congolense* infections and comparison is made with other diamidines. The drug was given intramuscularly or subcutaneously in a dosage of 3·5 mgm./kgm. body weight to cattle and dogs. Motile trypanosomes were no longer present in their blood 3–8 hours after drug administration and within 24 hours had completely disappeared, while from 1–5 hours after treatment the trypanosomes, although motile, were no longer infective for mice. This suggested that the action of the drug was a direct one on the parasites. This view was substantiated by measuring the concentration of drug in the blood of the host animal after treatment and using similar concentrations *in vitro*. The drug is soon bound irreversibly to the trypanosomes and the lethal doses *in vivo* and *in vitro* are very similar. It was also shown that in *T. congolense* infections in normal and splenectomized rats treated with Berenil the disappearance of trypanosomes occurred at the same rate. The drug was also found to have very little prophylactic action.

Further support for the view that Berenil acts directly on *T. congolense* was given by a study of the morphological changes which are caused in the parasite *in vitro*. In dogs the drug caused insignificant changes in blood sugar levels. The presence of excess sugar in short-term *in vitro* experiments appeared to lessen the trypanocidal effect of Berenil. Similar conclusions were reached *in vivo* when infected mice were given glucose by injection. When the blood sugar level in mice was, on the other hand, artificially lowered by drug treatment (Rastinon), Berenil appeared to act more efficaciously.

The author concluded that the activity of Berenil is connected with glucose metabolism by the trypanosomes. The irreversible binding of Berenil by these parasites was observed and phagocytosis by the host also plays a part in trypanosome destruction after the fixation of drug has occurred. *J. D. Fulton*

WATSON, H. J. C. & WILLIAMSON, J. **Suramin Complexes. III.—Preliminary Experiments on *Trypanosoma simiae* Infections in Pigs.** *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 72–81, 1 diagram. [22 refs.]

The results of preliminary experiments on the chemotherapy of *Trypanosoma simiae* in splenectomized rabbits and domestic pigs are recorded. The most promising drugs tested so far appear to be Antrycide chloride and Antrycide-suramin complex. *W. E. Ormerod*

BOUISSET, L., LESSA, A. & RUFFIÉ, J. Survie des trypanosomes et des hématozoaires dans le sang citraté et glucosé conservé en glacière. [**Survival of Trypanosomes and Plasmodia in Blood kept in a Refrigerator**] *C.R. Soc. Biol.* 1958, v. 152, No. 4, 674–8, 2 figs.

The authors tested the survival time of *Trypanosoma equiperdum* and *Plasmodium berghei* in blood mixed with citric-acid-soda-glucose anti-coagulant and kept in a refrigerator at +4°C. The viability of the parasites was determined by intraperitoneal inoculation of susceptible rodents. It was found that the trypanosomes retained their virulence for 6 hours, and the malaria parasites for 18 hours after having been placed in the refrigerator. [See also this *Bulletin*, 1957, v. 54, 536.]

C. A. Hoare

DE LUCENA, D. T. Reação de Guerreiro-Machado em cães do Município de Timbaúba. [**Guerreiro-Machado Reaction in Dogs in Timbaúba, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Oct., v. 9, No. 4, 447–50. English summary (6 lines).

Sera were + + to + + + + in 7 of 60 dogs tested.

Alzugaray, A. E., Iacovone, R. C., Domato, R. M. & Mailhes, N. L. Miocarditis chagásica crónica. Su inusitada frecuencia en el Policlínico San Martín. [**Chronic Myocarditis due to Chagas's Disease as seen in the Policlínico San Martín, Argentina**] *Semana Méd.* 1958, Sept. 18, v. 113, No. 12, 542–7, 572. [12 refs.]

The authors, from Argentina, calculate that of 3·5 million people at risk in endemic zones, there are 700,000 cases of Chagas's disease. In certain areas, for example Sebastian El Cano and Ojo de Agua, complement-fixation tests were positive in 62·3% and 71%, respectively. A table showing the results of studies between 1945 and 1951 in different areas, indicates that 19·7% of 3,071 investigations were positive by complement-fixation or xenodiagnosis or both. As the disease is largely one of bad environmental conditions, the authors were alarmed at the number of cases seen in the Policlínico San Martín since 1957, where 17 of 369 (4·66%) male patients in that year had heart lesions attributed to Chagas's disease. The possible extension of the endemic zone to Buenos Aires is considered: in 1951 there were 800 positive complement-fixation tests out of 2,360 carried out in persons in the city. Of the 369 patients seen in 1957, 70 had cardiac lesions and 17 of them had positive complement-fixation tests: all but 3 of these 17 showed electro-cardiographic changes or signs of cardiac insufficiency.

The authors have made a special study of 23 patients seen between 1957 and 1958. Although the patients mostly came from the provinces, especially from Santiago del Estero, they were living in Buenos Aires province, 4 of them in the Federal Capital. Most of the patients were over 50 years old. Most of them gave a history of bites by triatomid bugs, but only 2 recalled an initial lesion. All had positive complement-fixation tests. In general, arterial tension was within normal limits, 12 had cardiac insufficiency of a congestive type, 11 had right bundle branch block and 13 had extrasystoles: other cardiac changes were less frequently seen. There were 8 deaths, 4 from syncope, 3 from cardiac insufficiency, and 1 from a bleeding gastric ulcer. All these features are shown in 4 tables and a fuller study is promised.

H. J. O'D. Burke-Gaffney

Diamond, L. S. & Rubin, R. **Experimental Infection of Certain Farm Mammals with a North American Strain of** *Trypanosoma cruzi* **from the Raccoon.** *Exper. Parasit.* New York. 1958, July, v. 7, No. 4, 383–90. [11 refs.]

An account is given of the experimental infection of new-born piglets (12), lambs (4), kids (2) and calves (2), by subcutaneous and intracardial inoculation of cultures of *Trypanosoma cruzi*, which had been isolated from a naturally infected raccoon in Maryland, U.S.A. The course of

the infection was followed by examination of stained thick blood films and cultures, while intracellular stages of the parasite were sought for in sections of various organs removed at autopsy.

Practically 100% of the animals became infected with low-grade parasitaemia and, without showing any clinical manifestations, their condition being comparable to that of control animals. None of the organs examined showed any pathological changes, and tissue stages of the parasites were detected in the cardiac muscles of only one pig and one kid.

Since the number of trypanosomes in the blood of the experimentally infected animals appeared to be sufficient to infect triatomid bugs, the authors conclude that farm animals in contact with these insects might possibly serve as reservoir hosts of the infection. *C. A. Hoare*

PACKCHANIAN, A. & ROBINSON, A. **Electrocardiographic Studies in Experimental Chagas' Disease in Mice** (*Mus musculus*). *Texas Reports on Biol. & Med.* 1958, v. 16, No. 3, 363–79, 9 figs. [21 refs.]

Mice infected with *Trypanosoma cruzi* show histopathological changes, including myocardial, comparable to those seen in man and in the larger experimental animals harbouring this parasite. Electrocardiographic [ECG] studies have been done on the larger animals, but they have proved impracticable in mice by reason of the inadequacy of the usual ECG apparatus to record their rapid heart action.

The senior author and his associates have devised an ingenious modified string galvanometer ECG apparatus, with a camera speed of 90 mm. per second, for this purpose. The present authors describe in detail how mice were positioned and the apparatus was applied for ECG studies of *T. cruzi* infections in them. The technical details should be sought in the text, where there are illustrations of the apparatus and of the results obtained with it.

After studying tracings from 33 normal mice and 48 mice with acute, subacute and chronic Chagas's disease they conclude as follows:—

"Significant differences of means between infected and uninfected animals were found in measurements of P-R, QRS and Q-T intervals and in heart rate.

"Noticeable changes in conformation of curves in the acute group were as follows: increase in amplitude of S, doming and broadening of R′ and lowering of the T-takeoff.

"Differences of the means between acutely infected and uninfected animals were indicative of definite myocardial damage suggestive of myocarditis; while the significant changes in the subacute and chronic groups did not indicate a fixed pattern. In all cases, the significant

differences proved to be in the time factors and not in amplitudes of the wave."

A. R. D. Adams

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

MARUASHVILI, G. M. [**Epidemiological Significance of Different Species of *Phlebotomus* in Georgia**] *Med. Parasit. & Parasitic Dis.* Moscow. 1958, v. 27, No. 5, 591–5. [In Russian.]

The English summary appended to the paper is as follows:—

"On the territory of the Georgian Soviet Socialist Republic 11 species and varieties of Phlebotomus are encountered. These belong to 4 groups: Ph. papatasii, Ph. sergenti, Ph. major and Ph. minutus.

"The area of spreading of phlebotomi is Eastern Georgia. In rare cases they were found in one of the villages of Western Georgia, on the western slopes of the Suram mountain-ridge. They are encountered both in various premises of residential quarters and under natural conditions—in caves, holes, ruins of ancient monasteries, fortresses, etc. The spreading of individual species of Phlebotomus is characterized by their strict limitation to certain foci.

"By comparing the map showing the spreading of Phlebotomus with that of the spreading of visceral leishmaniasis, Borovsky's disease (cutaneous leishmaniasis) and of pappataci fever it will become evident that to the foci of these diseases correspond distinct species of mosquitoes. In the area of spreading of visceral leishmaniasis for the most part (up to 600 m. above the sea level) or exclusively (over 600 m. and up to 1240 m. above the sea level) Ph. chinensis and Ph. kandelakii are encountered, which should be considered as the carriers of this disease.

"From the East towards the West (within the boundaries of Eastern Georgia) the proportion of Ph. chinensis and Ph. kandelakii is gradually diminishing and, to the west of Tbilisi, along the valley of the Kura river, Ph. caucasicus begins to dominate numerically and it should be regarded as the carrier of Borovsky's disease. Ph. papatasii—the carrier of pappataci fever, is found in the area of visceral leishmaniasis in extremely small numbers (exclusively at the altitude of up to 600 m.), while in the foci of Borovsky's disease it occupies the second place. Pappataci fever is encountered in the area of Borovsky's disease, but is absent in that of visceral leishmaniasis.

"The peculiar distribution of sandflies according to their species and that of the diseases carried by them, should find their explanation in the natural and landscape features of the foci."

BRENER, Z. & PELLEGRINO, J. Reação de precipitina cruzada, no calazar, com fração polissacarídea isolada de formas de cultura do *Schizotrypanum cruzi* e *Leishmania brasiliensis*. [**Cross-Reactions in Kala Azar with the Polysaccharide Fraction isolated from Culture Forms of** *Trypanosoma cruzi* **and** *Leishmania brasiliensis*] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Oct., v. 9, No. 4, 501–2. English summary.

The authors, from Belo Horizonte, Brazil, have found the precipitin reaction with a polysaccharide fraction from culture forms of *Trypanosoma cruzi* to be sensitive and specific in the acute forms of Chagas's disease [this *Bulletin*, 1957, v. 54, 1300]. MUNIZ [*ibid.*, 1949, v. 46, 125] is quoted as pointing out that while sera prepared in rabbits against *Leishmania donovani* may react not only with the homologous precipitinogen, but with antigens from *T. cruzi* and *L. brasiliensis*, this does not in fact occur in persons with cutaneous or American visceral leishmaniasis, because of the low level of antibodies.

The present authors set out to study the possibilities of any such cross immunity. They carried out a precipitin reaction with polysaccharide fractions from *T. cruzi* and *L. brasiliensis* in 6 proved human cases of kala azar and in 4 dogs naturally infected with *L. donovani*.

When *T. cruzi* antigen was used, the reaction was positive in all the patients and in 2 of the dogs: with *L. brasiliensis* antigen, all but one of the patients and 2 of the dogs were positive: the reactions with human sera were less intense than those developing when *T. cruzi* antigen was used.

As it is sometimes necessary to make a differential diagnosis between the acute form of Chagas's disease and kala azar, because of their clinical resemblance, the occurrence of a cross-reaction with the polysaccharide fraction isolated from *T. cruzi* should be taken into account when this precipitin test is used in diagnosis. *H. J. O'D. Burke-Gaffney*

RODRIGUES DA SILVA, J. **Leishmaniose visceral (Calazar).** [Visceral Leishmaniasis] [Thesis]. pp. xx + 498, 142 figs. & 3 coloured pls. 1957. Rio de Janeiro: Apt. 1002, 185, Rua Sousa Lima, Copacabana.

This work represents the publication of a thesis in monograph form, devoted to the subject of visceral leishmaniasis with particular reference to Brazilian conditions. The first three chapters are introductory and describe the distribution of the disease in the world, the aetiology and classification, and the epidemiology, including the questions of animal reservoirs and of different methods of transmission (the principal vector being *Phlebotomus longipalpis*).

The history of kala azar in Brazil is related; paradoxically the first case to be described (in 1913) was in Paraguay, though it was contracted in the Matto Grosso; from 1934, with the introduction of a viscerotomy

service for yellow fever, diagnosis of cases was frequently made and today the distribution of the disease—chiefly in the eastern tip of the country (1,462 cases in the state of Ceara)—is well known.

The pathology of the disease as seen by the author is fully described in three chapters, with reference to the morbid anatomy (illustrated by a coloured plate showing the occasional development of cirrhosis in the liver) based on autopsy and biopsy material, to serological changes including disturbances of plasma proteins and liver function tests (related to histochemical reactions in liver biopsy material and here illustrated in a coloured plate) and to blood and marrow reactions (illustrated by a coloured plate of smears obtained by sternal puncture).

The clinical picture of kala azar in Brazil is presented in three chapters devoted to symptomatology, to complications (including mixed infections with schistosomiasis), and to prognosis, while useful accounts are given in separate chapters of methods of diagnosis and of treatment.

The book has an extensive bibliography which includes many South American papers not extensively quoted elsewhere in the literature. It is illustrated by 142 figures, chiefly of histological material and of human cases of kala azar. Readers will find this monograph useful for its descriptions in great detail of kala azar in Brazil and its clear presentation of the New World forms of the disease. *P. C. C. Garnham*

Eliseev, L. N., Kozlov, I. S. & Sidorova, G. A. [**Natural Foci of the Desert Type of Cutaneous Leishmaniasis in the Bukhara District of Uzbek S.S.R.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1958, Jan.–Feb., v. 27, No. 1, 69–73, 1 map. [In Russian.]

The authors report the occurrence in desert areas surrounding some of the oases of the Bukhara district, where cutaneous leishmaniasis is endemic, of natural foci of the disease, with a high percentage of infection among gerbils (*Rhombomys opimus*), which represent the reservoir hosts of human infection. *C. A. Hoare*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Combiesco, D. *et al.* Le typhus exanthématique épidémique. Caractères cliniques et épidémiologiques. Diagnostic de laboratoire et étude expérimentale du typhus exanthématique épidémique actuel. III–e mémoire (2–e partie). Diagnostic de laboratoire du typhus exanthématique épidémique actuel. [**Epidemic Typhus. Clinical and**

Epidemiological Characters. Laboratory Diagnosis and Experimental Study of Present-Day Epidemic Typhus. 3rd Report. Part II. Laboratory Diagnosis of Present-Day Epidemic Typhus] *Arch. Roumaines Path. Expér. et Microbiol.* 1958, Mar., v. 17, No. 1, 23–44, 1 graph & 5 folding pls. [23 refs.]

This paper presents the results of serological examinations carried out during the period 1953–55 in an area where typhus fever was endemic, from which the advantages of the complement-fixation (CF) test over the Weil-Felix (WF) test were apparent. In 72 primary infections, the WF test was positive at a titre of 1 in 400 or higher in 62·30% [given as 63·20% in the summary] while the CF test was positive at a titre of 1 in 16 or higher in 97·40% [97·60% in the summary]. Similarly, positive WF tests were obtained in only 22·63% of 54 relapsing infections which were all positive with the CF test. The CF test was generally superior to the WF test in providing evidence of potential sources of infection. Anamnestic reactions occurred in patients with a past history of typhus fever who had contracted other infectious diseases, especially pulmonary tuberculosis. It is emphasized that close attention to changes in titre is essential for the correct interpretation of serological tests.

[This is a useful report, although the presentation is obscure in places.]

[See also this *Bulletin*, 1958, v. 55, 995, 1095.]

R. S. F. Hennessey

KAWAGUCHI, M. [**Study on the Sanitary Insects from the Viewpoint of Clothing Hygiene, especially on the Migration, Distribution and Egg-Laying of Body-Lice for various Kinds of Clothing Materials**] *J. Osaka City Med. Center.* 1958, Apr., v. 7, No. 4, 280–304, 9 figs. [10 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Using body lice, one of the most remarkable insects from the viewpoint of clothing hygiene, an experimental survey was made on their migration, distribution and egg-laying for various kinds of clothing materials.

"The results are as follows:

"1) Materials of cloths: Among cotton (canequine), wool, ramie, silk (habutae), span lay (muslin), nylon (taffeta), and acetate (de chine), wool is most easily infested with lice, followed by cotton, ramie and span lay; smooth cloth such as nylon is least lousy. The eggs are most frequently laid on wool and muslin, but seldom on nylon. Of these four materials, cotton, wool, ramie and silk, lice of both sexes show the heaviest distribution on wool.

"2) Forms of cloths: Among the four kinds of cotton, flannel, serge, towel and canequine, towel is the easiest for immigration of the insects

and flannel and towel the easiest for heavy infestation. Among the seven kinds of cotton, serge, flannel, light knitted hosiery, its reverse side, towel, canequine, broad, egg-laying is observed most frequently on flannel or towel.

"3) Comparison of dirt of cloths: A light knitted hosiery cleaned out, and hosiery materials worn for 5, 15 and 30 days are compared, revealing the clothes worn for 30 days the lousiest, egg-laying being most frequently observed on 15 or 30 days clothes.

"4) Color of cloths: Canequine materials colored red, orange, yellow, green, blue and black are compared, revealing yellow and black the most remarkable in regard to egg-laying.

"On this experiment of migration, distribution and egg-laying of lice, it is generally concluded that lice prefer less smooth clothes, and in case of the same piece they like to infest where weaving and knitting is not even or where there are seams, wrinkles or creases, and that egg-laying is more common on dirty clothes, presenting a warning problem in clothing hygiene."

Cole, M. M. & Clark, P. H. **An Attempt to reduce DDT Resistance in Body Lice by Reverse Selection.** *J. Econom. Entom.* 1958, Oct., v. 51, No. 5, 665.

No loss of resistance was apparent in 20 generations [see this *Bulletin*, 1958, v. 55, 463].

Greisman, S. E. & Wisseman, C. L., Jr. **Studies of Rickettsial Toxins. IV. Cardiovascular Functional Abnormalities induced by *Rickettsia mooseri* Toxin in the White Rat.** *J. Immunology.* 1958, Oct., v. 81, No. 4, 345–54, 4 figs. [31 refs.]

"1. Intravenous administration of lethal quantities of murine typhus toxin to white rats is followed by a characteristic and reproducible pattern of changes in the meso-appendiceal vascular bed. After a latent period of about ½ hr, the large and small arterioles and precapillaries undergo a constriction that gradually increases in intensity until the animal dies. At the same time, capillary blood flow diminishes progressively finally leaving the capillary bed markedly ischemic. Epinephrine sensitivity of the terminal arterioles and precapillaries does not change throughout the course of the toxemia. Hemoconcentration is generally present terminally. Despite this, systemic arterial blood pressure in the unanesthetized animal remains essentially unchanged until near death. These observations suggest: a) capillary vascular permeability is increased in a remarkably specific manner that leaves unaltered the capacity of terminal arterioles and precapillaries to react

to epinephrine or to participate in certain reflex compensatory mechanisms and b) the humoral vasoexcitor mechanism (VEM) usually operative in acute blood loss does not function.

"2. The systemic arterial blood pressure in the anesthetized rat falls sharply at about the same time that the visible peripheral arteriolar constriction and slowing of blood flow commence. Unaltered hematocrit values at the time of rapid fall in arterial blood pressure stand as evidence against the occurrence of hemoconcentration at this early stage. These observations strongly suggest that cardiac output, at least in the anesthetized animal, is appreciably diminished early in the course of the toxemia prior to, and initially independent of, a reduction in total blood volume from the loss of plasma into the tissues through excessively permeable vessels.

"3. The distinctive pattern of peripheral vascular changes caused by lethal doses of murine typhus toxin in white rats differs in important details from the effects of lethal amounts of *Salmonella typhosa* endotoxin and from acute blood loss by hemorrhage."

[See also this *Bulletin*, 1955, v. 52, 890.]

Mohr, C. O. **Relation of Mean Number of Fleas to Prevalence of Infestation on Rats.** *Amer. J. Trop. Med. & Hyg.* 1958, Sept., v. 7, No. 5, 519–22, 1 fig.

Data collected from thousands of rats caught in the south-eastern states of the U.S. in the years 1946–47, in a control programme directed against the flea vector of murine typhus, are analysed. Two figures, the mean number of fleas per rat and the percentage of rats infested, are related to the origin of rats relative to four zones; these zones were related to the January isotherms for 55–60°F. for Zone I, 47–55°F. for Zone II, 40–47°F. for Zone III and 35–40°F. for Zone IV.

In Zone I the annual mean infestation rate was 49% with about 6·3 fleas per infested rat. The corresponding figures for Zone II were 36% and 2·4, Zone III 32% and 2·4, and Zone IV 34% and 1·8. Seasonal changes were found, thus in Zone I there was an increase in the number of fleas per rat in February without an increase in infestation rate; by May both rates had increased. Similar increases were noted in the other zones but at different relative rates. The annual decrease appeared firstly in the mean number of fleas per rat.

Most cases of murine typhus in Zones I, II and III occurred in August, after the peak of infestation, whereas in Zone IV most cases occurred in October and November during the second peak of high infestation for this Zone. This was thought to be connected with the artificial heating of buildings late in the year and the influx into these buildings of rats previously living away from buildings, a group of rats normally carrying only few fleas. *E. R. Nye*

WEYER, F. Beobachtungen bei der Übertragung von brasilianischem Fleckfieber und sibirischem Zeckenbissfieber auf die Kleiderlaus. [**Notes on the Transmission of Brazilian Typhus and Siberian Tick-Bite Fever in the Body Louse**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 174–93, 10 figs. [15 refs.]

A strain of *Rickettsia rickettsi* from São Paulo, Brazil, and two strains of *Rickettsia* from cases of Siberian tick-bite fever, were maintained in body lice by means of intrarectal or intracoelomic inoculation. The organisms multiplied in the cells of the stomach epithelium when they were introduced by either intrarectal inoculation or the natural method of feeding, but when inoculated into the coelom the multiplication was extracellular in the haemolymph. Both species of rickettsiae also readily developed in ticks (*Ornithodorus moubata*), mealworms (*Tenebrio molitor*), bed-bugs (*Cimex lectularis*) and other blood-sucking bugs (*Triatoma infestans* and *Rhodnius prolixus*). Both strains could be maintained in lice for several months without showing any diminution of virulence or alteration in pathogenicity. Maintenance in ticks and mealworms also did not affect the strains. On the other hand natural infection of bed-bugs could not be obtained with either the Brazilian or Siberian strains. When bed-bugs were inoculated intrarectally with large doses of the Brazilian strain virulent organisms could be detected only up to 24 days later, which does not support the assumption that bed-bugs are responsible for the natural transmission of "neotropical spotted fever" in Brazil.

As a rule the strains behaved uniformly in lice but generally the Brazilian strain was more pathogenic for lice than the Siberian strains but in some experiments the former lost the capacity to multiply in lice. Similar loss of virulence was also noted in a strain of *Rickettsia rickettsi* from Mexico, which was formerly highly pathogenic for lice, and also in several strains of *R. conori*. *Edward Hindle*

GAON, J. & GALL, Z. Raširenost Q-groznice medu ljudima i domaćim životinjama u NR BiH. [**Spread of Q Fever among People and Domestic Animals in Bosnia and Hercegovina**] *Higijena.* Belgrade. 1958, v. 10, No. 3, 200–206, 1 map. [12 refs.]

The English summary appended to the paper is as follows:—

"During a four-year survey (1954–1957) in P. R. Bosnia and Herzegovina sera from 1023 humans suffering from P. U. O. (pyrexia of unknown origin), were submitted for Weil-Felix reaction, C. F. test, leptospiral agglutination-lysis test etc.; 345 Widal-negative sera; 148 sera from healthy butchers; 496 from sheep, 1481 cattle; 164 dogs; 92 swine; 204 hens; 6 ducks and 45 horses sera were tested for C. F. method using Q-Fever (Henzerling) antigen.

"Of the human sera suffering from P. U. O. 9·98% showed positive reactions in titres of 1:4; 6·25% in titres of 1:8 or more. In 2·03% of the cases both by rising titres and clinical symptoms Q-fever has been diagnosed.

"Of the Widal-negative sera 26·6% showed positive reaction in titres of 1:4, 11·54% 1:8 or more.

"In 2·31% of the cases Q-fever has been diagnosed by rising titres and clinical symptoms.

"Of the butchers sera 14·81% showed positive titres 1:4, 8·10% in dilutions 1:8 or more.

"Of the sheep sera 10·76% have been positive in titres 1:4, 8·85% 1:8 or more.

"Of the cattle sera 3·52% have been positive in titres 1:4, 1·89% 1:8 or more.

"All of the dog, hen and duck sera gave negative results in dilution 1:4.

"Of the horse sera 4·76% and of the swine 2·38% were positive in titres of 1:4.

"It seems that the most frequent sources of infection for Q-fever in P. R. Bosnia and Herzegovina are sheep and very rarely cows."

ZUBKOVA, R. I. **Survival of *Rickettsia burneti* in Milk and Milk Products.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 9/10, 1259–63. [24 refs.] [Translated from Russian.]

"(1) *Rickettsia burneti* survives in artificially infected milk for 125 days at room temperature, and for 273 days at 4° (period of observation).

"(2) Existing methods of pasteurization are not effective in freeing milk from *R. burneti* which survives heating to 90° for 1 hr in unskimmed milk and dies after 1 min at 100°.

"(3) *R. burneti* will survive in curds and 1 day old kephir, but not in 1 day old junket and acidophilin."

BREZINA, R. **Contribution to the Study of Phase Variation in *Coxiella burneti*.** *Acta Virologica.* Prague. 1958, Apr.–June, v. 2, No. 2, 91–102, 7 figs. [15 refs.]

Complement-fixation tests on antigens prepared from 4 strains of *Rickettsia burneti* at different stages of serial egg passage, with homologous antisera collected from guineapigs at the 25th day after infection to detect phase II antigenic component, showed that transition from phase I to phase II occurred between the 10th and 13th egg passages. Fixation with low antigen and high serum dilutions appeared abruptly, antigen titres increasing in subsequent passages.

The percentage of guineapigs which developed antibodies reacting with phase I antigen after infection with strains which had undergone different numbers of egg passages was inversely proportional to the number of passages; thus, between 10 and 30% of animals infected with 2 strains in phase II which had undergone more than 30 egg passages showed phase I antibodies at the 13th week, whereas between 50 and 80% of animals infected with 3 strains which had undergone between 10 and 15 egg passages (1 in phase I, 2 in phase II) showed phase I antibodies at the 13th week.

Guineapigs inoculated with inactivated suspensions of 2 strains of *R. burneti* in phase II (10 and 25 egg passages) developed antibodies to phase I and phase II components, but a 3rd strain in phase II (25 egg passages) stimulated antibodies to phase II components only.

Phase I antigens absorbed antibodies reacting with phase I but not with phase II antigens, while phase II antigens absorbed antibodies reacting with phase II and, to a lesser extent, those reacting with phase I antigens. No differences between the immunogenic activities of phase I (2nd and 3rd egg passages) and phase II (13th egg passage) antigens of the Florián strain could be detected when guineapigs which had been vaccinated with these antigens were challenged with heavy doses of phase I organisms; vaccinated groups of 10 animals had less than 1 day's average duration of pyrexia compared with 8·4 days in non-vaccinated controls. Skin protection tests in rabbits showed that serum containing both phase I and phase II antibodies had no greater protective effect against phase I rickettsiae than serum containing phase II antibodies alone.

[See also this *Bulletin*, 1957, v. 54, 1171.] *R. S. F. Hennessey*

Mika, L. A., Pollok, N. L., Schneider, L. E. & Pirsch, J. B. **Studies on Mixed Infections. III. Influence of Immunological Factors in Combined** *Brucella suis* **and** *Coxiella burnetii* **Infection.** *J. Bacteriology.* 1958, Oct., v. 76, No. 4, 437–41. [13 refs.]

This paper describes experiments undertaken to determine whether or not immunological factors influenced the development of the increased resistance to *Rickettsia burneti* infection observed in guineapigs infected with *Brucella suis* [this *Bulletin*, 1956, v. 53, 306]. Neither active immunization with *Br. suis* vaccines nor passive immunization with *Br. suis* antiserum affected the severity of the rickettsial infection when guineapigs were subsequently challenged with *R. burneti*. The interference effect was only apparent when an active *Br. suis* infection was present at the time of challenge. The occurrence of increased resistance to *R. burneti* did not seem to be correlated with the development of skin hypersensitivity to rickettsial antigens in animals infected with *Br. suis*. Skin hypersensitivity was not observed until at least 40 days after

infection, whereas increased resistance to *R. burneti* could be demonstrated as early as 11 days after infection. The authors consider that this interference phenomenon is not explicable on the basis of demonstrable immunological factors. *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

SOPER, F. L. **The 1957 Status of Yellow Fever in the Americas.** *Mosquito News.* 1958, Sept., v. 18, No. 3, 203–16, 10 figs.

There were in 1957 only 77 cases of yellow fever in the American continents, but the apparent insignificance of this number in relation to the total populations is belied by the wide extension of their origins, the known re-activation of the simian cycle which has demonstrated its adaptability to a previously unsuspected mosquito, *Haemogogus mesodentatus*, the range of which extends northwards into Mexico, the localized steady persistence of cases in some areas in spite of repeated intensive vaccination campaigns, and a number of other disturbing evidences of viability of the virus. The past history of the disease is fully reviewed and illustrated by a number of very informative maps.

In the present position and with our present abilities jungle yellow fever is not a great threat to rural health because populations can be largely protected by effective vaccine. The risk of urban epidemics following the rural happenings has been reduced but by no means eliminated. Such transfer has in the past occurred in towns relatively close to infected forests, but there has recently been the first known example of the movement of a person infected in the jungle for a long distance by air before discovery. Protection of the town must still depend on the eradication of *Aëdes aegypti*, progress in which is described pictorially and in print. It has proceeded far but it is still essential that eradication should be achieved in the United States, Cuba, the Dominican Republic, Haiti, Puerto Rico, Jamaica and the other Caribbean islands, and Mexico. The risk of international travel of the disease remains material owing to the increase of air transport, and countries which have previously relied for freedom on relative isolation from virus-infected jungles may soon find that they are no longer effectively isolated.

G. Macdonald

DENGUE AND ALLIED FEVERS

COTAESCO, Eugenia & BADENSKI, G. Action hémagglutinante du plasma et du sérum des malades atteints de "fièvre de trois jours" (à papataci) sur les hématies humaines group "O" et sur les hématies des cobayes. [**The Haemagglutinating Action exerted by Sera of Papataci Fever Patients on Human Group O and Guineapig Erythrocytes**] *Arch. Roumaines Path. Expér. et Microbiol.* 1958, Mar., v. 17, No. 1, 151–9, 1 graph.

Serum and plasma from cases of papataci fever retained their agglutinating power after storage at 10°C. for 30 to 72 days. Both agglutinated human red cells at 4°C., serum to a titre of 1 in 256, plasma to a titre of 1 in 512, but failed to agglutinate at 20°C. and at 37°C. Control sera and plasma from healthy subjects and from persons suffering from serum hepatitis failed to agglutinate. After inactivation for 30 minutes at 56°C. the titre of both serum and plasma fell to 1 in 64.

Serum from cases of papataci fever agglutinated red cells from guinea-pigs to a titre of 1 in 2,048 and plasma to a titre of 1 in 1,024 at temperatures of 4°C. and 20°C. Both serum and plasma agglutinated to the same titre—1 in 512 at 37°C. The titre of control sera and plasma from healthy subjects also agglutinated but to a titre not exceeding 1 in 256. Inactivation reduced the titre of the test sera and plasma equally at 4°C. to 1 in 256 and at 37°C. to 1 in 64, but not at 20°C. Inactivation reduced the titre of control sera to zero at 37°C. and reduced it considerably at 4°C. and at 20°C.

The titre of sera from cases of papataci fever does not differ from the titre of sera from normal people or from persons suffering from serum hepatitis in its agglutinating action on red cells from fowl, sheep, rabbit or dog at any temperature. *P. A. Clearkin*

RABIES

SVET-MOLDAVSKAIA, I. A. **An Experimental Study on the Permeability of the Mucous Membranes of the Nose and Eye to the Virus of Street Rabies.** *Problems of Virology.* London. 1957, v. 2, Nos. 5/6, 345–8. [Translated from Russian.]

The author has previously shown that oral administration of rabies street virus affects 13–15% of rats and a few mice, sometimes with prolonged incubation periods. Intranasal inoculation of street virus caused rabies in one-third of the mice and a few more were found to have infection of the brain or semilunar ganglion when killed 3–5 weeks after infection. A few rats inoculated intranasally were found to be

infected but none showed symptoms within the duration of the experiment. 3 of 10 rabbits developed rabies after intranasal administration of virus and one more had a latent infection at the end of the experiment.

Conjunctival infection caused rabies in at least 3 of 38 mice and latent infections (some with Negri bodies) in a few more when killed at 35–40 days. A few latent infections only were found in rats inoculated on the conjunctiva within the duration of the experiment. 2 of 9 rabbits developed rabies and a few more had latent infections within the period of observation after conjunctival infection. *C. E. Gordon Smith*

LOIANNO, R. Reacciones por vacunación antirrábica. [**Reactions due to Vaccination for Rabies**] *Semana Méd.* 1958, Mar. 13, v. 112, No. 11, 392–8, 1 graph. [10 refs.]

The author quotes 7,774 persons given rabies vaccine in the years 1954–1957 at the rabies dispensary in Lanús, Argentina, on account of dog bites—in 790 cases the dogs are described as rabid, the rest disappeared or were suspected or were healthy. Semple and Yaoi vaccines were used. He reports 103 cases of reaction, mostly local with pruritus and occasionally adenitis or urticaria, headache or fever. In general the reactions were mild, though one fatal case of encephalomyelitis is reported, and 4 other patients required hospital treatment. Antihistamines were used in treatment, but for severe cases cortisone or hydrocortisone is advocated, especially if the nervous system is involved.

Charles Wilcocks

SVET-MOLDAVSKII, G. R. **The Pathogenesis of Neuroparalytic Complications after Anti-Rabies Vaccination in the Light of Studies with experimentally induced Allergic Encephalomyelitis. (Survey.)** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 9/10, 1311–16. [41 refs.] [Translated from Russian.]

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

SEAL, S. C. & BOSE, P. N. **Plague in Gauhati, Assam.** *Indian J. Pub. Health.* 1957, Apr., v. 1, No. 2, 119–22, 118, 1 map.

This is a short account of a small outbreak of bubonic plague which occurred in the town of Gauhati, which lies on the south bank of the

Brahmaputra, in the Kamrup District of Assam, during the months of October–December 1956.

The outbreak was of particular interest because there has been no incidence of plague in Assam within living memory; it escaped even the last pandemic which started in 1895 and which ravaged a large part of India for more than 20 years. The outbreak was of interest also because a team, which included the authors, had visited Assam in 1948 to investigate a very fatal epizootic among rats in the Darrang and North Lakhimpur Districts which are also in the valley of the Brahmaputra, but there was no evidence of plague infection, and no human case of plague was discovered.

The Gauhati outbreak was of importance because, apart from the fact that the town was virgin soil, it is the gateway to Assam, the seat of the University, of the High Court, and many important institutions. It has a population of about 100,000, and has many important communications by road, steamer, rail and air, and a rat-epizootic once established might threaten the State itself as well as neighbouring States.

The outbreak started on 22 October 1956 with a number of rat deaths in a congested commercial locality. Bacteriological investigation at the Pasteur Institute at Shillong was at first negative but later the nature of the infection was fully established. Malaria gangs were diverted to carry out intensive DDT spraying throughout the affected areas, and this was continued for 5 days. The resources of the local health staff were reinforced by the Assam Government organization, the entire town was sprayed with DDT and Gammexene by 26 November, and 50,000 people had been immunized with vaccine from the Haffkine Institute, Bombay. The last human case was reported on 2 December. The authors were unable to obtain the vector fleas responsible for transmission of the infection. There were only 4 human cases of which 2 ended fatally.

The authors had reason to believe that the infection persisted among the rat population, and it was evident that a comprehensive scheme of control measures should be devised and instituted. This was done by the authors and submitted to the Government of Assam.

E. S. Phipson

De Freitas, C. A. Notícia sôbre a peste no Nordeste. [**Observations on Plague in North-East Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 123–33, 1 graph. English summary.

Plague was introduced to Brazil by shipping at the port of Santos in 1889 and had established itself as an endemic disease in north-east Brazil by 1902. The paper outlines the organization for control, which was poor up to 1936 but has been progressively developed from then until the present day, on a national basis, by the National Plague Service.

Xenopsylla cheopis, *X. brasiliensis*, *Leptopsylla musculi*, but rarely *Ctenocephalides felix* or *C. canis*, are the fleas recorded from domestic rodents (varieties of *Rattus rattus* and the house mouse *Mus musculus*), of which many hundreds of thousands have been captured over the years in systematic catches in towns and rural places. In 1952 extensive catches of wild rodents and other small mammals were also begun. Flea collections are still being worked out; the genus *Rhopalopsyllus* is reported as very common on these animals. Tables record the species of wild mammals taken, giving numbers and localities. Although sporadic cases of plague in wild rodents have been reported, sylvatic plague is not considered to be of practical significance in Brazil. A chart and table show the human cases and deaths from plague from 1935 to 1954 in north-east Brazil. There were, in 4 towns, in 1935 569 cases with 232 deaths but by 1954 only 2 non-fatal cases (at Recife). The improved drug treatment of patients, and intensive rodent and flea control by various methods which have been developed during these years and since, are briefly indicated. The endemic area had been reduced to 82,192 square kilometres by 1955. Control measures are now applied over a total of just over 97,000 square kilometres. *D. S. Bertram*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Seal, S. C. & Mathen, K. K., with the technical assistance of A. Ghosh-Hazra, K. Das Gupta & M. V. Raman. **A Study of the Contributions of Social Factors to the Continued Prevalence of Cholera in the City of Calcutta.** *Indian J. Pub. Health.* 1956, Oct., v. 1, No. 1, 9–19, 1 map & 7 figs.

In this paper the authors present the results of an enquiry into the relationship between the incidence of cholera in Calcutta and the socio-economic and environmental conditions of the people attacked. The present study was undertaken during a period of epidemic prevalence between April 1953 and September 1954, covering two epidemic seasons.

Investigations under 11 different heads were undertaken to compare the incidence under each head with similar information obtained from the general population, and a number of facts emerge, most of which are what might be expected, while a few of them are curious and not easy to interpret. They are summarized as follows:—

(a) Most, but not all, of the affected wards abut on the River Hooghly, a highly contaminated waterway, or on one of its branch canals.

(b) Incidence was higher among visitors than among residents.

(c) The age distribution of the patients and that of the general population were almost identical.

(d) Hindus and Muslims were affected in almost equal proportions.

(e) Some 90% of the patients were illiterate as against 47% of the city population.

(f) 93% were in the habit of washing their hands before meals.

(g) More than 90% of the patients were rice-eaters.

(h) Nearly 90% of the cases occurred in conditions of gross overcrowding.

(i) Poor economic status and especially abject poverty had a profound effect. The average family means per month was less than Rs.25 [under £2] in half the affected families, and it exceeded Rs.50 [under £4] in only 3·8% of the families.

(j) Persons living and working at home accounted for 90% of the cases.

(k) Sanitary conditions in most of the houses or huts concerned are described as "appalling", with gross overcrowding, bad water supply, open bucket latrines and little attention to collection and disposal of refuse, to drainage or to general cleanliness.

The authors express the opinion that their findings indicate the lines on which measures of control should be founded, which indeed they do, though some are less convincing than others, such as the fact that 94% of the patients were rice-eaters which suggests to the authors that rice-eating may predispose a person to contract cholera. Might it not merely suggest that the great majority of the citizens of Calcutta are rice-eaters?

The grossly insanitary conditions which obtain in the poorer parts of the city are, by and large, the principal causes of continued epidemicity, and their eradication will tax the resources of the Department of Health to the utmost. *E. S. Phipson*

SEAL, S. C. **The Causative Germ in relation to the Problem of Epidemicity and Endemicity of Cholera.** *Indian J. Pub. Health.* 1957, Jan., v. 1, No. 1, 27–42. [Numerous refs.]

A general review and discussion with suggestions for further work.

KHUNDANOV, L. E., AZARGINOVA, F. S. & SHKURKO, E. D. **Effect of Immune Serum and Some Antibiotics on Experimental Cholera Infection.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 9/10, 1424–9. [Translated from Russian.]

"(1) Cholera antiserum has a comparatively weak therapeutic action but a fairly pronounced prophylactic effect.

"(2) Its bactericidal action *in vitro* persisted for 3 to 72 hr from the

time of contact with the organism and was observable only with fresh samples of serum.

"(3) A single prophylactic dose of streptomycin given 3 hr before infection did not protect white mice from cholera; given at the time of infection it protected 70–80 per cent of mice; a single dose given 1 hr after infection protected 80–100 per cent, 3 hr after, 20–50 per cent, and 6 hr after, 10–30 per cent.

"(4) Chlortetracycline showed a bactericidal, bacteriostatic and bacteriolytic effect on *V. cholerae in vitro*; the bactericidal effect was evident only at high concentrations (100–125 units per ml), and in low concentrations it was bacteriostatic (1·56–0·078 units per ml), giving marked inhibition of growth compared with the controls.

"(5) Used prophylactically in two doses totalling 15,000 units chlortetracycline protected 67·5 per cent of mice, used therapeutically it protected 20 per cent, while all the controls died."

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

STROCZYŃSKA, Maria. Wstępne badania nad przydatnością pożywek Nelsona, LES i Pawłowej dla hodowli *Ent. coli.* [**Preliminary Investigations of the Suitability of Nelson, LES and Pawlowa Media for the Cultivation of** *Entamoeba coli*] *Wiadomości Parazytologiczne.* Warsaw. 1958, v. 4, No. 3, 197–205, 4 charts. English summary.

A comparison has been made of the efficacy of Nelson, LES [Locke, egg, serum] and Pawlowa media for the isolation of *Entamoeba coli.* In parallel examinations of stool specimens from 142 persons *Ent. coli* was isolated in 2·8, 11·3 and 30·8% of cases in the 3 media respectively. The percentage of isolations in LES medium could be increased by adding penicillin. In an investigation of the effect of storage of the specimens before inoculation the percentage of isolations by all methods combined fell from 22·6 in inoculations carried out after 2 days to 9 after 10 days.

D. J. Bauer

FARJO, P. D. **A Study of the Pathogenicity of** *Entamoeba histolytica.* *Bull. Endem. Dis.* Baghdad. 1958, Jan., v. 2, Nos. 3/4, 138–47. [11 refs.]

BUONOMINI, G. Sulla condotta da seguire per una corretta diagnosi parassitologica di amebiasi. [**On the Procedure to follow for a Correct Parasitological Diagnosis of Amoebiasis**] Reprinted from *Epatologia*. Rome. 1958, Apr.–June, v. 4, No. 2, 109–15. [15 refs.] English summary (2 lines).

In this lecture the author discusses briefly various methods for the parasitological diagnosis of amoebiasis, and gives some indications of the differential characters of human intestinal amoebae. The following procedure is recommended for the different clinical types of amoebiasis: (a) in chronic cases, cysts should be sought for in normal stools, and in faeces concentrated by Ritchie's sedimentation method or by Faust's flotation method; (b) in subacute cases faeces obtained with the aid of purges should be examined for the presence of trophozoites in fresh and stained preparations; (c) in acute cases, diarrhoeic stools (passed in the laboratory or hospital) should be examined in fresh and stained preparations; (d) diarrhoeic stools or those obtained with purges should be cultivated, and cultures examined after 24 and 48 hours in fresh and stained preparations. *C. A. Hoare*

PARODI, L. L'amoebome tumeur colique inflammatoire à caractères anatomiques propres à propos de 4 observations. [**Amoeboma of the Colon and its Anatomical Features**] *Méd. Trop.* Marseilles. 1958, Sept.–Oct., v. 18, No. 5, 755–82. [Numerous refs.]

Dissatisfied with the wide and imprecise use of the term amoeboma the author, after references to the literature on this subject, attempts to classify the lesions embraced by this term. He concludes that they fall into the following classes:—

(1) A localized inflammatory tumour involving all the layers of the wall of the colon; this gives rise to an acute intestinal obstruction like that resultant on a malignant neoplasm.

(2) (a) True amoeboma, or a tumour restricted to the mucous membrane; this is often without ulceration and apparently free from amoebae when examined in histological section.

(b) An inflammatory amoeboma due to a mixed amoebic and bacterial infection; this may cause perforation or it may extend directly into adjacent tissues.

Both these types occur as a rule in the ascending or transverse colons.

(3) Amoebic polyp formation, which arises from the deeper layers of the bowel wall and usually is found in the recto-sigmoid region. The manifestations here are more medical than surgical.

The absence of parasites in sections does not mean that such lesions have not originated from the amoebae; these may have been destroyed in the tumour by the tissue reaction in it. *A. R. D. Adams*

JEFFERY, G. M. **Epidemiologic Considerations of Isosporiasis in a School for Mental Defectives.** *Amer. J. Hyg.* 1958, May, v. 67, No. 3, 251–5.

In the autumn of 1955 a few cases of infection with *Isospora belli* were reported in a school for mentally defective Negro children in South Carolina [see this *Bulletin*, 1957, v. 54, 294]. Further surveys were carried out in 1956 and during the summer of that year 85 of the 194 children were examined, of whom 9% showed *Entamoeba histolytica*, 32% *E. coli* and 22% *Giardia intestinalis*, in addition to other intestinal parasites, but coccidia were absent. During the first week of October an explosive outbreak of diarrhoea occurred in the children, of whom 16 out of 89 showed oöcysts of *I. belli* in the faeces; later in the same month the epidemic spread to the employees and 12 of 29 exhibited the parasite. The symptoms included persistent diarrhoea with the passage of light-coloured fatty stools, fever, nausea and loss of weight. In one patient oöcysts continued to be passed for 87 days (mean persistence was 29 days). The explosive nature of the outbreak suggested that a single factor was responsible, but in spite of a detailed epidemiological enquiry its nature remained undisclosed; possibly deliberate or accidental contamination of food by a mentally defective inmate was the cause.

P. C. C. Garnham

CABANEL, G. & LACROIX, R. Un cas de dysenterie à *Balantidium coli*. [**A Case of** *Balantidium coli* **Dysentery**] *Algérie Méd.* 1958, May, v. 62, No. 5, 591–2.

[See also this *Bulletin*, 1958, v. 55, 1014.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES

SPARROW, Hélène. Étude du foyer éthiopien de fièvre récurrente. [**A Study of the Ethiopian Focus of Relapsing Fever**] *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 4, 673–710, 8 figs. on 4 pls. [52 refs.]

The author starts with a summary of the history of tick-borne and louse-borne relapsing fever in the course of which it is recalled that although this disease was known to Hippocrates, it was only in 1843 that the term "relapsing fever" was introduced, by CRAIGIE and HENDERSON, to designate an epidemic that had broken out in Edinburgh. The greater part of the article is devoted to an account of a mission to Ethiopia

undertaken by the author on behalf of the World Health Organization between 1 March and 14 May 1955. In the course of this expedition 15 strains of relapsing fever were isolated in the high plateaux, but only 8 survived the journey from Addis Ababa to the Pasteur Institute at Tunis. The strains were obtained by feeding lice on patients with the disease and they were subsequently maintained in lice by Weigl's method of rectal inoculation. An outbreak of *Rickettsia rocha-limae* infection, which is pathogenic to lice, created further difficulties and was only eliminated after return to Tunis where passages in man could be effected.

Attempts to infect *Ornithodorus moubata* were made on two occasions by feeding the ticks on patients at the height of infection, but with negative results. All the strains were found to belong to the louse-borne type, *Spirochaeta recurrentis*, and their behaviour was studied both in relapsing fever therapy in patients in mental hospitals and in new-born rats and mice. Some of the patients were refractory to strains which produced infection in other patients inoculated at the same time. The author gives reasons for excluding the possibility of an earlier acquired immunity in these patients and was unable to find any explanation for the phenomenon. The strains retained their virulence to man after passage in lice for at least 9 months, but those passaged in new-born rats and mice after a few passages were much less certain of producing infection in man than the strains maintained in lice. Lice preserved at −72°C. for at least a year, when dissected and inoculated into patients, regularly produced infection.

This mission confirmed the existence in Ethiopia, and probably beyond its frontiers in the highlands of East and Central Africa, of a vast focus of louse-borne relapsing fever. The author suggests that further research should be undertaken to delimit this focus and also study the relation between the louse-borne and tick-borne strains of the disease and the possible existence of transitional forms. *Edward Hindle*

ANDERSON, I. G. **A Note on Relapsing Fever occurring in two Europeans.** *Central African J. of Med.* 1958, Oct., v. 4, No. 10, 444–5.

2 cases in the Salisbury area, S. Rhodesia.

GEL'TTSER, R. R. & KRYLOVA, O. P. **A Study of the Granules of Spirochaetes. III. The Antigenic Properties of the Granules of the Spirochaetes of Caucasian Tick Relapsing Fever.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 9/10, 1281–2. [Translated from Russian.]

"From these results the following conclusions may be drawn:

"(1) After immunization with an antigen consisting of only granules, lysins and agglutinins against the spiral forms of the spirochaetes are

formed. Tick spirochaetes are weak antigens. The lysin titre of the sera of guinea-pigs which have recovered from spirochaetaemia and which are immune to repeated inoculation is usually not higher than 1 : 10.

" (2) Under the influence of immune serum granules are formed in the spirochaetes."

FARQUHAR, J. W., EDMUNDS, P. N. & TILLEY, J. B. **Sodoku in a Child. The Result of Mousebite.** *Lancet.* 1958, Dec. 6, 1211–12. [17 refs.]

A case in Northumberland.

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

TARABINI C., G. Ideas sobre la inmunoalergia hanseniana. [**Concepts of Immuno-Allergy in Leprosy**] *Rev. " Fontilles ".* Alicante. 1958, Jan.–June, v. 4, No. 5, 355–62. [10 refs.] English summary.

ARU, L. & ZONCHELLO, S. Sulla reazione di agglutino-sedimentazione di rubino nella lepra. [**Rubino's Agglutino-Sedimentation Test in Leprosy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Aug., v. 39, No. 8, 483–91.

The English summary appended to the paper is as follows:—

" The authors have carried out Rubino's agglutino-sedimentation reaction in 15 leprous patients' serums studying the role of the erythrocytes group and their age, since the moment of the blood withdrawl.

" No relation was found between the erythrocytes group and the serum reactivity, while the erythrocytes aging decreased considerably both their sensitivity and specificity."

[See this *Bulletin*, 1931, v. 28, 960.]

ARU, L. Emoagglutinazione ed emolisi condizionata nella lepra. [**Haemagglutination and Conditioned Haemolysis in Leprosy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Sept., v. 39, No. 9, 593–9. [10 refs.]

The English summary appended to the paper is as follows:—

' The authors have carried out both hemoagglutination and hemolysis conditioned by *M. tuberculosis* polyoside in 15 individuals affected by

Lepra L and in 6 affected by Lepra T. The hemoagglutination highest mean titres were found in L cases, while T cases showed a higher hemolysis titre. In the severe L cases the M.D. [Middlebrook-Dubos] titres were lower than in the clinically satisfactory cases. Nine L and two T patients were seen again 16 months after the first examination. In those who had improved or were stationary the hemoagglutination and hemolysis titres had risen as compared to the previous values; in those whose conditions had grown worse the above-said titres were notably lowered."

THANGARAJ, R. H. **Early Symptoms in a Tuberculoid Case of Leprosy.** *Leprosy in India.* 1957, Oct., v. 29, No. 4, 165–6.

"An early case of leprosy has been followed for two and a half years. Some of the very early symptoms noted in this case are:—

"1. Burning sensation and numbness.
"2. Pain and hypersensitive skin which came after the above symptoms but persisted for over two years.
"3. Anaesthesia in a localized area which increased gradually.
"4. Thickening of the nerves.
"5. Loss of sweating.
"6. Appearance of skin lesions one month after putting the patient on D.D.S."

GHOSH, S. & KUNDU, S. **Nasal Destruction caused by Tuberculoid Type of Leprosy.** *Leprosy in India.* 1957, Oct., v. 29, No. 4, 163–4, 2 figs. on pl.

Report of a case.

TERENCIO DE LAS AGUAS, J. Terapéutica de la lepra. [**Treatment of Leprosy**] *Rev. "Fontilles".* Alicante. 1958, Jan.–June, v. 4, No. 5, 295–315. [Numerous refs.]

A general review.

SOMERSET, E. J. & SEN, N. R. **Prognosis of the Ocular Lesions of Leprosy.** *Leprosy in India.* 1957, Oct., v. 29, No. 4, 142–7.

The authors examined a series of cases of leprosy, both lepromatous and non-lepromatous, in 1946 and again in 1955. In the interval the patients had been treated with the sulphone group of drugs. The authors' conclusions were as follows:—

"14 cases of *non-lepromatous leprosy* were examined generally and ophthalmologically and re-examined 9 years later. Lagophthalmos and resultant exposure keratitis are the only ocular complication to note. It may occur even while the general condition of the patient is improving.

Loss of vision can be largely prevented by timely and adequate tarsorrhaphy.

"11 cases of *lepromatous leprosy* were similarly re-examined after 9 years. Sulphones did not appear to prevent the development of ocular complications. Two developed superficial punctate keratitis and 5 developed iritis during treatment. One case of iritis also showed choroido-retinitis.

"Efficient local treatment is the most important measure in the treatment of the ocular complications of leprosy. The necessity of the help of an ophthalmologist in leprosy clinics is noted."

D. P. Choyce

WALLACE, J. H. **Leukocytic Transfer of delayed Sensitivity to Normal Guinea Pigs from Rats infected with** *Mycobacterium lepraemurium*. *J. Immunology*. 1958, May, v. 80, No. 5, 362–6, 1 fig. [17 refs.]

In the experiments in this paper, leucocytes from rats infected with *Mycobacterium leprae-murium* were shown to be capable of passively transferring hypersensitivity to normal guineapigs.

The donor rats were infected intraperitoneally 6 hours after birth with *Myco. leprae-murium* and again, subcutaneously, 1 month later. The leucocytes were obtained from the peritoneal cavity 2 days after the injection of light mineral oil. The cells were transferred to normal guineapigs either by intradermal or intracardial injection. The test antigens were 1:5 OT, 3% homogenate of peritoneal lepromas from mice (MLM), and a suspension of normal mouse (peritoneal) tissue (NMT). These antigens were injected along with the leucocytes when the cells were injected intradermally, and separately when they were injected intracardially. Spleen homogenates of the donor rats were also transferred to guineapigs, and these were injected intraperitoneally but in this case the testing with the antigens was delayed for 48 hours. The reactions were read at 24 and 48 hours.

Following the intracardial injection of the cells, reactions were produced only by the MLM antigen; these reactions were, however, small, being only about 5 mm.^{2} in area. The reactions following the intradermal injection were complicated by the cells from normal rats giving a reaction of about 50 mm.^{2} Injection of the antigen with the cells did not, however, increase the size of the reaction, whereas the reactions from the cells of leprotic rats were much larger when they were injected with OT and NMT antigens; the sizes of these reactions ranged from 79 to 254 mm.^{2} and they differed from those observed after systemic injection, for those from OT tended to exceed those from MLM. Heating the cells for 30 minutes at 50°C. abolished their specific reactivity.

S. R. M. Bushby

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

GERNER-SMIDT, M. Schistosomiasis. Oversigt og et nyt dansk tilfaelde. [**Schistosomiasis. A Survey and a Report of a Recent Case in Denmark**] *Nordisk Med.* 1958, Nov. 27, v. 60, No. 48, 1720–22, 2 figs.

The English summary appended to the paper is as follows:—

"An account is given of the aetiology, symptomatology, diagnosis, and treatment of schistosomiasis. A case is reported, and it is pointed out that in the future the disease may become more common in Scandinavia, as a result of the increased communications between the countries and of the stationing of Scandinavian military units in Ghaza."

PITCHFORD, R. J. **Bilharziasis in Swaziland.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 735–50, 2 figs.

"Although no full-scale survey of the prevalence of bilharziasis in Swaziland has been carried out, examinations of schoolchildren have revealed *S. mansoni* infection rates of up to 49% in some areas, and *S. haematobium* infection rates ranging from 3% to 75%. The highest prevalence occurs in areas where there are thickly populated African reserves, or irrigation schemes. The spread of infection is encouraged by the use of rivers, dams and canals for bathing and washing purposes. Preventive measures are recommended, including the provision of more suitable bathing, washing and latrine facilities for the population, the control of waste waters, and the use of molluscicides."

BRYGOO, E. R. Mollusques et bilharzioses humaines à Madagascar. Enquêtes épidémiologiques 1955–1957. [**Snails and Human Schistosomiasis in Madagascar. Epidemiological Studies in 1955–1957**] *Arch. Inst. Pasteur de Madagascar.* 1957, v. 26, 41–112, 11 maps. [43 refs.]

The author's summary in French is freely translated as follows:—

We present the first results of an enquiry into schistosomiasis of man, organized by the health service administration and the Pasteur Institute of Madagascar. These results are based on the identification of snails from 695 habitats distributed almost throughout the whole of the island

and on the examination of 43,076 faecal specimens and 52,696 specimens of urine.

Distribution maps are given of the different kinds of snails and of the endemic foci of schistosomiasis. Much remains to be done to gain a better understanding of the vector hosts.

Although at first sight schistosomiasis seems to be of little importance as a morbidity factor in Madagascar, its role should not be underestimated. Most of the population is exposed to infection by at least one kind of schistosomiasis. Only the province of Tananarive is truly free. The distribution of the probable vector snails far exceeds the actual endemic foci.

All economic development schemes which put into operation the irrigation of crops should be aware of the dangerous threat of schistosomiasis. *J. J. C. Buckley*

i. Berdonneau, R. Quelques propos sur une épidémie de bilharziose. [**Observations on an Epidemic of Schistosomiasis**] *Rev. Méd. et d'Hyg. d'Outre-Mer.* 1958, Oct. 15, v. 30, No. 271, 118–22.

ii. Montestruc, E. Considérations sur les signes de début et l'immunité dans le bilharziose. A propos d'une "épidemie de bilharziose à *Sch. mansoni*". [**Reflections on the Early Signs of Schistosomiasis and on Immunity**] *Ibid.*, 122–6.

i. On 30 May 1957 a party of young Europeans, resident in Martinique for 1–3 years, with some local residents, totalling 16 in all, went to a high waterfall in which 13 of them bathed. 10 were in this water for 10 to 20 minutes; the other 3 for 30 to 45 minutes. Increasing pricking of the skin began shortly after immersion; it became so severe that the bathers sought relief by plunging into the adjacent sea. Thereafter they visited a restaurant and ate, among other articles, a salad.

The 3 patients immersed for over 30 minutes (group A) developed increasing urticaria 8 to 10 days later; during the 15th to 20th days they were seriously ill, with fever and muscular pains. A diagnosis of typhoid acquired from infected salad was made and treatment was given for this with seeming benefit; but 45 days after the immersion their troubles recurred in graver form and with dysenteric diarrhoea. Some days later *Schistosoma mansoni* eggs were found in the stools and the cause of the illness became clear.

Group B, consisting of 4 Europeans and 3 local people exposed to infection for a lesser period, developed similar troubles but of less severity. Group C, consisting of 3 local people already infected with the parasites for some years, suffered only minor symptoms; while group D, the 3 people who had not bathed, remained well.

During the very severe toxaemic reaction 2 of the 3 patients in group A were given 30 mgm. of delta-dihydro-cortisone daily for 15 days and there

was remarkable remission of their fever and symptoms. Eosinophilia in this series of cases was proportional to the weight of the infection; the corticoid treatment resulted in a substantial though temporary fall in the eosinophil counts of the 2 patients to whom it had been given.

ii. Enlarging on the clinical resemblance to typhoid of the disease seen in the above patients who proved to be infected with schistosomiasis the author cites other similar outbreaks which he has encountered in the same area. In these a diagnosis of typhoid or of typhus (particularly murine) was considered probable, though it was not definitely established; it now seems clear that in fact they also were probably due to schistosomal infection.

[See also MARQUES, this *Bulletin*, 1958, v. 55, 1347.]

A. R. D. Adams

DAVE, P. J. & DHAGE, K. R. **Re-Survey and Present Status of the Endemic Focus of Schistosomiasis.** *Indian J. Med. Res.* 1958, July, v. 46, No. 4, 546–56, 1 map.

A house-to-house examination of the people of Gimvi, in the Ratnagiri District, south of Bombay, 933 in all, for schistosomiasis infection was carried out in the 10 localities comprising the village [see also this *Bulletin*, 1956, v. 53, 606, 769]. 81 were found positive. [It is not made clear whether these were positive for haematuria, presence of eggs in the urine, or both.] 71 of these patients were from 2 localities; the remaining 10 were from 3 nearby localities and numbered 2, 4 and 4 respectively. The distribution of these positive cases according to age-group and sex is given in detail. The highest number, 22 cases, was in the 10–15 group and infected males were invariably more numerous than females. Observations were made on the occurrence and distribution of the aquatic snails, *Ferrissia tenuis* and *Paludomus obesa*.

[The discovery of this endemic focus in 1952 (*ibid.*, 1953, v. 50, 317), the first of its kind in India, aroused world-wide interest among parasitologists, especially when the snail intermediaries later reported to be involved proved to be species hitherto unheard-of in the transmission of human or animal schistosomes. The latter finding has not been accepted unreservedly; neither has the identification of the infection as *Schistosoma haematobium*, for hitherto there has been a disappointing failure to recover adult parasites from experimentally infected animals. The authors of the article express the view that "Unless a synchronous attack is launched completely to close down the river by providing protected water supply for domestic and drinking purposes together with complete treatment of active cases, the attempts or hopes of eradication of this focus will be futile". From the map of Gimvi village supplied with the article, it can be estimated that it is little more than one-sixteenth of a square mile in area, given point A to B in the text as two furlongs

long. Of this area the two localities, Upper and Lower Maratha Wada, containing 87% of the infected people, together appear to cover only about 10–15 acres. Such a small and closely limited focus of infection could in fact be easily eradicated; the disease has been described as benign, and with eradication of the focus scientific data of great interest may be irretrievably lost.] *J. J. C. Buckley*

MARTINS, A. V. **Non-Human Vertebrate Hosts of** *Schistosoma haematobium* **and** *Schistosoma mansoni*. *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 931–44. [70 refs.]

"The author reviews the results of experimental infections of various species of mammals, other than man, with *S. haematobium* and *S. mansoni*, and discusses investigations in Africa and Brazil into the possibility of the natural infection of non-human vertebrates with these two parasites. Only a few species, besides monkeys, could be easily infected with *S. haematobium* in the laboratory, while—outside man—natural infection with this parasite appears to be practically non-existent. On the other hand, many animals are good experimental hosts for *S. mansoni*, and at least 21 species of mammals have been found infected with this parasite in Africa and America. It is thus possible to state, provisionally, that man is the only reservoir of *S. haematobium*, but the question still remains open where *S. mansoni* is concerned. Further research is suggested in order to assess the importance of non-human reservoirs in the epidemiology of bilharziasis."

HUBENDICK, B. **Factors conditioning the Habitat of Freshwater Snails.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1072–80.

In this note the author discusses the factors which condition the habitats of fresh-water snails without references to the wider aspects of limnology or to the intimate relationships between snails and habitats. Fresh-water snails usually have a wide ecological tolerance and their habitat requirements overlap to some extent from one species to another although they are not quite identical. The various environmental factors which influence a habitat may mutually affect one another and it is sometimes difficult both to distinguish and to estimate the importance of a single factor. The different factors involved are discussed and listed as follows: size, volume and depth; shore profile; water movement; temperature; changes in water level; insolation; transparency, suspended matter and pollution; substratum and vegetation; dissolved minerals; dissolved gases; hydrogen ion concentration; microclimate; other organisms; population characteristics; snail dispersal. *J. J. C. Buckley*

ABDEL MALEK, E. **Factors conditioning the Habitat of Bilharziasis Intermediate Hosts of the Family Planorbidae.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 785–818, 3 figs. [Numerous refs.]

"In this article, the author examines certain physical, chemical and biological characteristics of water-bodies which make them suitable or unsuitable as habitats for planorbid snails acting as vectors of bilharziasis. The principal conditioning factors appear to be: amount of food available; extent of the growth of aquatic weeds; oxygen content of the water; amount of sunlight able to penetrate the water; strength of the current; nature of the substratum; ionic composition of the water; and presence or absence of parasites and predators. Several of these factors are interdependent. Although there are differences between the various species in their habitat requirements, their ranges of tolerance were found to overlap greatly. The optimum conditions are similar for all species, but extremes are tolerated better by some species than by others. Theoretically, extremes of certain factors should be capable of eliminating snails from a body of water; in practice such extremes rarely occur, and the absence of vectors must be attributed to the combined effect of several factors. Although certain parasites and predators exterminate vectors in the laboratory, the author considers it unlikely that they would do so in nature, as under laboratory conditions the biological balance is disturbed to the disadvantage of the snail. The data available are still too scanty for an exact assessment to be made of the importance of individual environmental factors in controlling the size of vector populations; but this review of present knowledge indicates the lines along which further investigation can be most profitably pursued."

MARILL, F. G. Sur les variations de la composition chimique de l'eau et les variations d'abondance de *Bulinus truncatus* Audoin. [**Variations in the Chemical Composition of the Water and in the Frequency of** *Bulinus truncatus*] *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1064–70, 2 figs.

An attempt was made to find if there was any correlation between the variation in the frequency of *Bulinus truncatus* and the variation in the salinity of the water in which they live. The habitats investigated were a siphon well and a compensating reservoir, both of which supply the irrigation system for a small village in Oran, Algeria. The observations were carried out over a number of years. The results are tabulated and illustrated graphically. "The analysis of these two tables and the graphs . . . make it apparent that no clear correlation can be established between the variations in the chemical composition of the water and those of the frequency of *Bulinus*" [abstracter's translation]. *J. J. C. Buckley*

ABDEL MALEK, E. **Distribution of the Intermediate Hosts of Bilharziasis in relation to Hydrography: with special reference to the Nile Basin and the Sudan.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 691–734, 9 figs. [51 refs.]

Although there is much uniformity in the Ethiopian fresh-water fauna, due probably to pre-tertiary connexions between the main river systems, certain differences are perceptible in the present fauna which are attributed to differential evolution in drainage systems. The past and present hydrography in the Central East African Plateau and the effect of hydrographic changes on the distribution of fresh-water molluscs in this region are first discussed and the species of *Biomphalaria* and *Bulinus* occurring in some lakes and rivers of this plateau are tabulated. The Sudan is next discussed, in considerably greater detail. Its vegetation and climate are described and the hydrographic factors which influence the distribution of the snail intermediate hosts are outlined as follows: (a) natural flow of the Nile northward; (b) flood plains; (c) rains; (d) hafirs (pits dug by man); (e) dams; (f) irrigation. Vegetation, rainfall and hydrographic features are illustrated by useful maps. The distribution of the vector snails is dealt with extensively after a preliminary account of malacological literature and fossil records of snails of the Sudan. The known distributions of *Bulinus* (*Bulinus*) spp., *Bulinus forskali*, *Bulinus* (*Physopsis*) spp. and *Biomphalaria* sp. are indicated separately and with admirable clarity on 4 separate distribution maps. Most of vector snail sites on these maps were sampled by the author himself. Snail sites reported in the literature from the Sudan and adjacent territories are documented. Observations are made on the distribution and ecology of the vector snails and the conclusions therefrom are summarized.

Finally the hydrography of the Lower Nile Valley (Egypt) and the distribution of the vector snails in this region are discussed.

This is an important paper which cannot be suitably summarized and should be consulted in the original by those interested.

J. J. C. Buckley

GAUD, J. Rythmes biologiques des mollusques vecteurs des bilharzioses. Facteurs saisonniers et climatiques influençant le cycle de reproduction de *Bulinus truncatus* et de *Planorbarius metidjensis* en Afrique du Nord. [**Biological Rhythms of Snail Vectors of Schistosomiasis. Seasonal and Climatic Factors influencing the Reproduction Cycle of** *Bulinus truncatus* **and** *Planorbarius metidjensis* **in North Africa**] *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 751–69, 3 figs. [28 refs.]

The English summary appended to the paper is as follows:—

"The study of seasonal rhythms in the fertility and development of snail intermediate hosts of bilharziasis is very important for the epidemiology and prophylaxis of this disease.

"In North Africa the main aspects of these seasonal rhythms are known with respect to *Bulinus truncatus* and *Planorbarius metidjensis*. The former is found more frequently in summer and its reproductive activity is practically non-existent from December to May. *Planorbarius metidjensis*, on the other hand, is more frequent in spring and disappears almost completely in summer.

"These seasonal rhythms are determined by many factors whose respective roles cannot be easily discerned. The existence of an internal organic rhythm, whether specific or racial, seems to be excluded. Laboratory breeding shows temperature to be important; light does not seem to interfere with the effect produced by temperature and, in fact, any influence it has is in the same direction. Nevertheless, comparison of the seasonal rhythms in the same snails but in different countries shows that temperature is not the only factor. One hypothesis—possibly the most satisfactory—is that the differences observed in the rhythms of *B. truncatus* according to whether its habitat is North Africa, Egypt or Iraq, are related to the seasonal swelling of the water-courses. The drying-up of the water collections also appears to be a fairly important factor, in particular with respect to *Pl. metidjensis*.

"There is need for further study of the evolution of populations of those snail species which act as intermediate hosts of bilharziasis, in different habitats and in different climates."

ALVES, W. **Chemical Constituents of Surface Water in Southern Rhodesia, with special reference to the Molluscan Vectors of Bilharziasis.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1071.

"In Southern Rhodesia, experienced snail collectors carried out a long and painstaking search for bilharziasis vector snails in various bodies of surface water (excluding irrigation canals). When the waters were declared either snail-free or snail-infested, samples taken from each were subjected to chemical analysis, in an attempt to correlate chemical composition with the presence or absence of snails."

Most of the samples (41) from snail-free waters were low in calcium and most of these situations were fairly free from pollution. However, in some bodies of pure water with low salt content, either *Bulinus* (*Physopsis*) or *Biomphalaria* was present. The *p*H value of the water samples was seldom distinctly acid. "This would seem to stress the importance of factors other than acidity in discouraging snail growth."

Many of the samples (73) from snail habitats were rich in calcium and magnesium but many others had a low salt content; in the latter, however, pollution of some kind could be demonstrated and evidently plays an important role in making a habitat suitable for snails.

J. J. C. Buckley

De Meillon, B., Frank, G. H. & Allanson, B. R. **Some Aspects of Snail Ecology in South Africa. A Preliminary Report.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 771–83, 1 map.

"In this paper, the authors present the preliminary results of a recent ecological survey of some rivers in the Transvaal, Union of South Africa.

"Representative samples of the molluscan fauna of the rivers were collected and chemical analyses of the river waters were carried out. In addition, such characteristics as current speed, temperature, turbidity, biochemical oxygen demand and amount of oxygen absorbed from potassium permanganate were determined.

"No evidence was obtained to show that the chemical composition of natural, unpolluted waters plays any part in determining vector snail habitats. Current speed was found to have some effect, bilharzia vector snails not being found in fast-flowing waters.

"Of the other factors, turbidity was shown to be of some importance, probably because it affects the growth of the algae on which certain snails seem to depend for their proper development, and severe pollution with sewage and industrial wastes also appeared to have an adverse effect on the snail population."

Hairston, N. G., Hubendick, B., Watson, J. M. & Olivier, L. J. **An Evaluation of Techniques used in estimating Snail Populations.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 4, 661–72. [13 refs.]

The quantitative assessment of a snail population may be required to determine changes in population density or in the total area infested with snails. At the beginning of a project it is desirable to carry out a series of tests, comparing the results from exhaustive methods with those from less time-consuming ones which may be subsequently employed as a routine. Snails are not evenly distributed even when the habitat appears uniform, and it is erroneous to sample only an accessible part of the habitat. The age structure of the snail population should also be estimated by recording the shell size or counting the number of whorls.

Population sampling techniques may be either direct or indirect. The former include methods in which collections are made over a specified part of the habitat or for a specified time. They may be exhaustive or fractional. Exhaustive techniques attempt to obtain all the snails in a known area; in several methods a tube is pushed into the bottom mud which is then removed and strained through gauze, while in another hinged jaws bite out a known area of bottom or weed. A third type of collecting instrument is a drag scoop which scrapes the bottom and side

of a canal; it is particularly useful for *Bulinus truncatus*. None of these methods can be used in areas containing large stones.

Fractional techniques are those in which only a part of the snails in the sampling area are obtained. They are easier and more rapid and they vary according to the habitat. The quadrat method consists of a metal ring which is dropped on terrestrial or semi-aquatic habitats and all visible snails on the surface within the ring are counted. Dip nets and sieves are used for aquatic snails but results are often inconsistent and difficult to interpret. Counts per unit of time are unsuitable in terrestrial habitats and are better in aquatic situations. Sometimes a combination of fractional techniques gives better results, such as searching a marked area by means of a standard sieve for a measured time.

Indirect methods include marking, release and recapture of snails in a habitat. The method is usually impracticable, requires ancillary information not easy to obtain and is based on assumptions. Palm-leaf traps reveal the presence of aquatic snails but are of little quantitative value.

The appropriateness of a method in a particular case is decided by the nature of the habitat, the aims of the project and the resources available. *Oncomelania* habitats suit either quadrat or tube sampling. Aquatic habitats in irrigation systems can be qualitatively sampled by palm-leaf traps or exhaustive techniques can be used, especially the drag scoop or a tube-sampling method. In natural waters a weed-box grab or drag scoop will give good results in shallow water, or in deeper water the use of a standard sieve for a measured time over a specified area. For a simple control programme the qualitative or easier quantitative techniques will be satisfactory, but in detailed ecological studies exhaustive techniques should be used. *T. H. Davey*

MARILL, F. G. Sur l'appréciation comparative de la richesse des gîtes en mollusques fluviatiles notamment en *Bulinus truncatus* Audouin. [**Comparative Estimation of the Relative Density of Snail Species in a Habitat, especially** *Bulinus truncatus*] *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1057–64.

A simple method is described for determining the relative density of different species of snails in the same habitat; it is a modification of the palm-leaf trap principle. The snail trap is made from domestic mats of closely-woven dwarf palm leaves. It is square (30 cm.) or semi-circular (60 cm. diameter) in shape and is strengthened by hemming the edge with iron wire. Stone ballast keeps it in position at the bottom of the snail habitat.

Preliminary trials with these traps resulted in the recovery of greater numbers of snails from the traps than from the snail habitat itself.

[Details are not given as to how the collecting was done in the latter.] The snails collected were *Bulinus*, *Physa*, *Planorbarius*, *Limnaea* and *Ancylus*. The number of egg nests deposited on the traps was also counted and compared with those in the habitat. In general, the number of egg nests on the traps was fewer than elsewhere.

The author discusses his results [which are tabulated] and states that no final conclusions can be drawn from them. He also points out the advantages and disadvantages of this method of sampling the constitution of a snail population in a given habitat. Precautions necessary in further tests of the value of this technique are outlined.

J. J. C. Buckley

PELLEGRINO, J. Diagnóstico das esquistossomoses pela reação intradérmica. [**Diagnosis of Schistosomiasis by Means of the Intradermal Reaction**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 105–21. [Numerous refs.] English summary.

This paper, whose author is a member of the Brazilian National Institute for Endemic Rural Diseases, represents a contribution to the African Conference on Schistosomiasis held under the auspices of WHO in Brazzaville in November 1956.

The author reviews at length, and with considerable reference to the literature (there are some 80 references), the preparation, use and interpretation of the intradermal reaction for schistosomiasis. He describes the several methods of collecting and processing of cercariae, the collection of adult worms, eggs and miracidia, and the preparation of the antigen itself. He then describes the technique of the reaction, the criteria used for its interpretation, its sensitivity and specificity and the question of standardization. The use of the reaction in epidemiological surveys and as a test of cure is then discussed, and finally a number of recommendations are made.

The test should be made with small quantities of antigen (0·01 to 0·05 ml.) to avoid false positive reactions, and should be judged on the size of the resulting weal: it is best read at 15 minutes. It is highly sensitive (about 90%) in adults, but less so in children: occasionally false positive reaction occurs.

It has not so far been possible to achieve completely satisfactory standardization of the antigen: the author is pursuing a method based on the linear relationship between log antigen concentrations and mean responses. The use of the intradermal reaction in epidemiological surveys has been studied, but not to a sufficient extent. There is not complete agreement on the use of the reaction as a test of cure and some reports have shown that a skin test with egg antigen may become positive in 80% of patients after treatment, although it had been negative in most of them before.

The author recommends that special attention should be given in further studies to objective standardization of the test; its use in epidemiological surveys; the question of obtaining purified antigens; biological standardization; and the behaviour of the intradermal and passive transfer tests before and after treatment, because of the presence of circulating antibodies in infected patients.

H. J. O'D. Burke-Gaffney

FORSYTH, D. M. **Post-Schistosomal Uropathy.** *Lancet.* 1958, Nov. 8, 990–92.

Schistosomal infection is sporadic but not endemic in Kuwait. The author considers treatment of *Schistosoma haematobium* with antimony or Miracil D to be unsatisfactory because ova lodged in the tissues may continue to cause the original symptoms of the disease—dysuria, urgency, frequency, or haematuria. Recurrent urinary tract infection occurs after sterilization of, or destruction of, the adult female worms. This aspect of the disease is largely neglected in text-books, the authors of which in dealing with the sequelae of schistosomal disease neglect to make clear whether the worms have all in fact been destroyed.

6 case histories of urinary schistosomiasis are detailed; the patients were treated with anthiomaline, with anthiomaline and Stibophen, with sodium antimony tartrate, with Miracil D and sodium antimony tartrate, or with 2 or more of these drugs. In all cases symptoms and signs persisted, and in some corrective surgical measures were necessary. The prognosis in severe or advanced urinary schistosomiasis is poor, even when the infection is eradicated; in patients with recurrent symptoms further specific treatment for the worm infection should not be given until viable ova re-appear in the urine.

A. R. D. Adams

NELSON, G. S. *Schistosoma mansoni* **Infection in the West Nile District of Uganda. Part III. The Spleen and** *S. mansoni* **Infection.** *East African Med. J.* 1958, Sept., v. 35, No. 9, 543–7. [20 refs.]

Enlargement of the spleen is often believed to be a feature of *Schistosoma mansoni* infection—for example in "Egyptian splenomegaly". Workers in East and South Africa, on the other hand, have not found an association between the two. Malaria is the commonest cause of enlargement of the spleen in the West Nile province of Uganda. At Ewadri in the Western Uplands (4,000 ft.), and at Paidha (5,000 ft.) in the Southern Highlands, the malaria parasite rate is higher than the spleen rate; but at Pakwach (2,000 ft.) in the Nile Valley the reverse is the case—and particularly so in children. *S. mansoni* infection rates in these 3 areas are 4·2%, less than 1·0%, and 36·7% respectively. At

Pakwach schistosomiasis in part accounts for the spleen rate in children. The results of studies at Arua, Jonam, and elsewhere in W. Nile Province are analysed in tables; from these it appears that *S. mansoni* infection is associated with an increase of 10–20% in the spleen rate in children under 10 years of age, and with a decrease of 10% in the spleen rate in adults and older children. No satisfactory explanation for this latter fact can be advanced. At any rate there is no evidence that *S. mansoni* infection caused "Egyptian Splenomegaly"—that is gross spleen enlargement in association with liver cirrhosis, or the Banti syndrome.

[For previous parts, see this *Bulletin*, 1959, v. 56, 174, 175.]

A. R. D. Adams

NELSON, G. S. *Schistosoma mansoni* **Infection in the West Nile District of Uganda. Part IV. Anaemia and** *S. mansoni* **Infection.** *East African Med. J.* 1958, Oct., v. 35, No. 10, 581–6. [14 refs.]

A study has been made of haemoglobin levels in relation to *Schistosoma mansoni* infection in the West Nile District of Uganda. At first observations were made on hospital out-patients and easily accessible students in secondary schools. When the results showed no significant differences between infected and non-infected persons the observations were continued in the heavily infected Nile valley where a more representative population was available. Thus 777 persons were examined in the villages of Jonam County. Haemoglobin was measured and a sample of faeces was examined for *S. mansoni* and also hookworms. The haemoglobin levels were low throughout, but there was a consistent lowering of haemoglobin values in young children of both sexes and in females over the age 20 when infected people were compared with non-infected controls. The differences were within the range of rather less than 1 gm. haemoglobin per 100 ml. An interesting comparison was made between two villages, one of which was infected with both parasites and the other with hookworm only.

Jonam	Age	2–10	11–20	21–40	Over 40
S. mansoni 40·6%	No.	270	143	226	141
Hookworm 40·0%	Hb. gm.%	7·38	8·67	9·19	8·81
Rigbo-Obongi	**Age**	**2–10**	**11–20**	**21–40**	**Over 40**
S. mansoni 0	No.	175	163	137	78
Hookworm 58·3%	Hb. gm.%	7·73	9·04	9·38	9·1

The author suggests that his results indicate that *S. mansoni* is one of the many factors responsible for the very low haemoglobin levels in the West Nile Province of Uganda.

H. Lehmann

PITCHFORD, R. J. & HARRISON, W. O. **Treatment of Bilharziasis with Antimony Dimercaptosuccinate.** *South African Med. J.* 1958, Sept. 27, v. 32, No. 39, 966–7.

Friedheim's TWSb (antimony-a, a′-dimercaptosuccinate) was used for the treatment in hospital of 36 Bantu males (20–40 years of age) doubly infected with *Schistosoma haematobium* and with *S. mansoni*. A total dosage of 2·0 gm. to 2·8 gm. was given in divided doses daily over 2 to 10 days. The higher daily dosage schedules caused severe side-reactions with signs of acute liver damage demanding cessation of the treatment in some patients; in some instances these did not appear until after treatment and they were severe and dangerous. In the lower dosage schedules, where there were no side-effects, TWSb proved effective against *S. haematobium* infections; it was ineffective in all dosages against *S. mansoni* infections. *A. R. D. Adams*

VAN DER SCHALIE, H. **Vector Snail Control in Qalyub, Egypt.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 2, 263–83.

"The author describes a pilot study in vector snail control carried out in 1953–54 by the Bilharziasis Control Project in Qalyub, Egypt.

"After giving a brief description of the site chosen for the Project—an area of some 5000 acres (2000 hectares) under perennial irrigation—he presents a detailed account of the various snail surveys of the irrigation canals and drains and of the molluscicidal treatment of infested channels.

"He points out that despite the thoroughness of the surveying and treatment the snails were not completely eliminated from the area and stresses that the high cost of the molluscicide used (copper sulfate) would prohibit its widespread and continual use. He considers, however, that pending the perfection of such long term bilharziasis control measures as improved sanitation, better treatment facilities, and health education of the public, snail control is of the first importance and determined efforts should be made to find more efficient and cheaper methods of effecting it."

SMITHERS, S. R. **Attempted Control of** *Bulinus senegalensis* **Müller, a Vector of** *Schistosoma haematobium* **in the Gambia.** *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 315–19.

This paper describes an attempt to control *Bulinus* (*B.*) *senegalensis* in the Gambia by means of sodium pentachlorophenate. The snail lives in stagnant seasonal rain pools in the laterite, which dry up after some months. It was hoped that a single application of the molluscicide at the beginning of the rains would destroy all the vectors. As briquettes were not available the calculated weight of pentachlorophenate was divided into several small sacks which were "dumped" evenly throughout some of the pools, while others were sprayed with the chemical. The final dilutions in the 6 pools treated ranged from 2 parts per million to 10

p.p.m. for the dumping method and 2 and 5 p.p.m. in the two sprayed pools.

Live snails disappeared from sprayed pools and were reduced in "dumped" pools by the third day after treatment. After 4 weeks no living snails were found in any treated pool but after 10 weeks they had returned to all except one pool, and in the two largest pools were at pre-treatment level by the 15th week. Some snails probably escaped poisoning by burrowing into the mud and remaining there until the molluscicide had disappeared. The molluscicide had declined to one-fifth of its original dilution by the third day, probably owing to the action of sunlight and mud, and in the "dumped" pools it was unevenly distributed. The pentachlorophenate salt proved herbicidal to water-lily and lotus plants. Though complete control of the snails was not obtained transmission was considerably reduced. *T. H. Davey*

Pessôa, S. B. & Amorim, J. P. Contribuição para a história natural da esquistossomose mansônica no Nordeste Brasileiro, e sugestões para a sua profilaxia. [**Observations on the Natural History of Mansonian Schistosomiasis in North-East Brazil, with Suggestions for Control**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 5–18. English summary.

The authors review the position regarding *Schistosoma mansoni* infections in north-east Brazil, with special reference to Alagoas, Paraiba and Sergipe. They give some figures to show that in a number of districts studied the incidence of infection in young people aged 10–19 varied between 33·1% and 81·3% and in those over the age of 20 was about the same. On the other hand, infection was rare in infants under 3 years, varying from 0 to 8·9%, even where the general incidence is high. Small infants are bathed by their mothers in clear waters, but once the children can walk, they tend to frequent peri-domestic foci, such as canals, drains and the like, which are liable to be infested with vector snails. The probable relationship between the infectivity of a focus and the density of infected snails might with advantage be studied on a large scale in mice exposed at different times to water suspected of containing infective cercariae.

Children of 3 to 4 years acquire visceral lesions which account for infections found later in adult life. The authors found the acute toxaemic stage almost entirely in children in the endemic areas studied: resistance occurs after intermittent exposure after a period of time, but it is relative because severe infections may occur in adults exposed to heavy infection: an example is given of such severe infections among workers in the former National Malaria Service who were exposed by virtue of their occupation to cercariae in foci where *Australorbis glabratus* was commonly found.

The authors find a relationship between the degree of transmission in a locality and the percentage of indigenous children aged 3 to 10 years

who are infected with schistosomiasis: examples are given for 4 areas in the State of Alagoas where the general index of infection was 31·5%, 50·9%, 60·5% and 58·5% and the percentages of infected children under 3 years were respectively 12·6%, 24·8%, 32·6% and 48·4%.

"Adults are rather victims of sequels of the disease acquired in their youth." Hence, young people with the infection should be treated with antimonials. Canalization of water and improved disposal of sewage are not by themselves sufficient to eradicate the disease in a particular area: attention must be paid to eliminating peri-domestic foci, particularly slow or stagnant currents with abundant vegetation, ditches and the like which tend to dry up in the summer and which are frequented chiefly by young people.

The molluscicide favoured by the authors is a mixture of tar dissolved in kerosene and Gammexane: this is mixed with sand at a rate of 80 gm. tar and 40 gm. of Gammexane per kgm. The authors make further suggestions regarding molluscicides, particularly a study of the use of crude petroleum and other substances which can modify the biotope of the snail.

The authors stress the importance of educating the population in regard to the control of schistosomiasis. *H. J. O'D. Burke-Gaffney*

Barbosa, F. S. **The Taxonomic Position of the Snail Vectors of** *Schistosoma mansoni*. *Publicações Avuls. Centro Pesquisas Aggeu Magalhães*. Recife, Brazil. 1956, v. 5, 49–52. [16 refs.]

"At least five genera in the family Planorbidae dispute the legitimacy of containing the vectors of *Schistosoma mansoni* in America and Africa. They are according to their priority: *Taphius* H. and A. Adams, 1885; *Biomphalaria* Preston, 1910; *Tropicorbis* Pilsbry and Brown, 1914; *Platytaphius* Pilsbry, 1924 and *Australorbis* Pilsbry, 1934."

This is a thoughtful and impartial assessment of a taxonomic problem which has come into the melting-pot recently. The pros and cons of various views and possible solutions are discussed and the author gives his opinion that all the species of snails which carry *S. mansoni* are probably congeneric but that it is inadvisable to make any systematic changes at present until internal examination of more species has been carried out. However, he advises the retention of the American species in the genera *Tropicorbis* and *Australorbis* and the African species in *Biomphalaria*. *J. J. C. Buckley*

De Andrade, R. M. & Paulini, E. Nota sôbre a composição elementar de Australorbis glabratus (Say, 1818), coletados em Belo Horizonte e Neves, Estado de Minas Gerais, Brasil. [**Note on the Elemental Components of** *Australorbis glabratus* **collected in Belo Horizonte and Neves, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Oct., v. 9, No. 4, 559–65. English summary.

CHAIA, G. & PAULINI, E. Da ação do pentaclorofenato de sódio e do sulfato de cobre sôbre ovos e miracídios de *Schistosoma mansoni*. [**Action of Sodium Pentaclorophenate and of Copper Sulphate on Eggs and Miracidia of** *Schistosoma mansoni*] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Oct., v. 9, No. 4, 511–14.

The English summary appended to the paper is as follows:—

"The toxic action of solutions containing sodium pentachlorophenate or copper sulphate in concentrations of 2, 4 and 8 ppm for NaPCP and 20, 40 and 80 ppm $CuSO_4.5H^2O$ was studied on freshly hatched miracidia of *S. mansoni*. The following LT_{100} values were observed: more than 60, 21 and 2 minutes with the solutions of NaPCP; 12, 10 and 8 minutes with those of $CuSO_4$.

"The eggs of *S. mansoni* survived the action of $CuSO_4$ solution of 1,000 ppm for 3 hours and that of NaPCP of 100 ppm for 2 hours."

BRENER, Z. & CHIARI, E. Ação da Fuadina e do Miracil D sôbre os estádios iniciais de desenvolvimento do *Schistosoma mansoni* no Camundongo. [**Action of Fouadin and Miracil D on the Initial Stages of Development of** *Schistosoma mansoni* **in Mice**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Oct., v. 9, No. 4, 485–8. [10 refs.]

The English summary appended to the paper is as follows:—

"The inhibitory action of Fuadin and Miracil D upon the schistosoma in an early stage of development was studied. Mice experimentally infected with *Schistosoma mansoni* were treated with Fuadin (150 mg./kg, twice a day, for five days) and Miracil D (200 mg/kg, once a day, for four days) one day after inoculation. Marked reduction of the number of worms and granuloma was observed in the treated animals. This reduction was greater in the mice treated with the antimonial drug. However, treating animals 2, 3, 4 and 5 weeks after inoculation checked the immature worm resistance to the antimonial drug."

BRENER, Z. Observações sôbre a ação da Fuadina e do Miracil D em camundongos experimentalmente infectados com *Schistosoma mansoni*. [**Action of Fouadin and Miracil D in Mice experimentally infected with** *Schistosoma mansoni*] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Oct., v. 9, No. 4, 489–96. [10 refs.]

The English summary appended to the paper is as follows:—

"There have been given the results achieved in experimental therapeutics for schistosomiasis mansoni using the method for isolating schistosome granuloma from mice livers. With a view to standardize and

check the method under study there have been employed Fuadin and Miracil D.

"Using Fuadin in doses of 50, 100 and 150 mg/kg (twice a day, for 5 days) from the 32nd after inoculation it has been observed a marked relationship between the doses given and the decrease in the number of granulomas and worms. That decrease was even more sensible when the drug was given in two series, starting on the 32nd and 45th day after inoculation. Treating mice with 52 days of infection, when the eggs had already reached the liver, giving origin to granulomas, the difference between the number of granulomas of the treated and untreated mice was not statistically significant, as was expected.

"Miracil D, in doses of 200 mg/kg (for four days) and 400 mg/kg (single dose) also provided a sensible reduction in the number of granulomas.

"The data obtained emphasizes the availability of the isolation of granulomas from mice livers in the screening of drugs in experimental therapeutics for schistosomiasis mansoni."

De Carneri, I. Osservazioni sugli indici dell'azione chemioterapica di sostanze attive su *Schistosoma mansoni* nel topo. [**Indices of the Action of Drugs on** *Schistosoma mansoni* **in Mice**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, June, v. 39, No. 6, 400–424, 5 figs. on pl. [Numerous refs.] English summary.

As part of a series of experiments on the drug treatment of *Schistosoma mansoni* 20 white mice weighing 10 gm. each were infected intraperitoneally with 70 cercariae; the faeces were examined 48 days later for ova, and 8 days after that the mice were divided into 2 groups of 10, one group receiving treatment, the other being used as a control.

The treated mice were given 1-diethylaminoethylamino-4-methylthioxanthone 50 mgm./kg. daily by mouth for 5 days. Both groups were kept for a further 35 days, examinations for miracidia being carried out twice weekly. They were killed 36 days after treatment began, and the organs were examined for live and dead worms (classified as to sex), brown pigment and live and dead ova.

In the control group dead worms were never found alone; all 10 mice had live ova and pigment in the liver and 9 out of 10 hatched out miracidia. All the animals in the treated group had pigment in the liver, 2 were free from schistosomes, 6 had dead ova in the liver and 5 out of 10 hatched out miracidia. The differences are regarded as statistically significant.

The author concludes that in mice the most sensitive index of the action of any particular drug on *Schistosoma mansoni* is the interruption or cessation of excretion of ova, but the success of any treatment depends on the number of infecting schistosomes. *W. K. Dunscombe*

Hsü, H. F. & Hsü, S. Y. Li. **The Prepatent Period of Four Geographic Strains of** *Schistosoma japonicum*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, July, v. 52, No. 4, 363–7, 1 fig.

"The prepatent period of the Formosan strain of *S. japonicum* was shown to vary according to the degree of susceptibility of the host-species. In general, this period was longer in the Chinese and Formosan strains than that in the Japanese and Philippine strains. The results of experimental studies on the prepatent period of four geographic strains in albino mice supported the above statement. The prepatent period was significantly longer in the Chinese and Formosan strains than in the Japanese and Philippine. Differences in means of the prepatent period as well as differences between standard deviations were not significant, either between the Chinese and Formosan strains, or between the Japanese and Philippine strains."

Liu, Chün-Shih, Li, P'ing-Sheng, Wu, Chen-Yü & Yang, Teh-Chen. **The Value of Cercariae Membrane Reaction in the Diagnosis of Schistosomiasis japonica.** *Chinese Med. J.* Peking. 1958, Aug., v. 77, No. 2, 136–43, 6 figs. on pl.

"1. Of the sera from 300 cases of schistosomiasis japonica tested with C.M.R. [the original should be consulted for the details], 283 produced positive results (94·3%). An enveloping precipitate developed in 1 of the 34 patients with paragonimiasis and 1 of 36 normal persons so tested. No positive reaction was obtained in other trematode infestations or the various diseases used as controls. Before the real value of C.M.R. can be properly ascertained, extensive investigations concerning cross reactions with other trematode infections seem necessary.

"2. Compared with the skin tests, C.M.R. may be considered to be of more diagnostic value.

"3. C.M.R. may be classified into three types: membrane type, granular type and mixed type. The membrane type and the mixed type are more significant diagnostically than the granular type.

"4. The result of C.M.R. is related to the dilution, the freshness and the number of cercariae used for the test. The simplified method recommended in this paper can be used in mass surveys.

"5. The diagnostic value of C.M.R. for acute or late schistosomiasis cases is discussed."

Tsou, Huan-Wen & Ying, Yueh-Ying. **A Pathologic Study of Intestinal Schistosomiasis associated with Cancer.** *Chinese Med. J.* Peking. 1958, Sept., v. 77, No. 3, 244–53, 16 figs. on 4 pls.

"1. 33 cases of intestinal schistosomiasis associated with cancer were studied; 23 were males and 10 females. The average age was 40·4 ± 1·84 years. 70% of the lesions were located in the rectum and sigmoid colon.

"2. Together with the above cases, 179 cases of simple intestinal schistosomiasis and 162 cases of simple intestinal cancer were also studied. The incidence of intestinal schistosomiasis associated with cancer was 15·5% and that of intestinal cancer associated with schistosomiasis was 16·9%. The average age of the patients with schistosomiasis was 32·3 years, of the intestinal cancer patients 46·3 ± 1·09 years, and of the patients with intestinal schistosomiasis associated with cancer 40·4 ± 1·84. Thus intestinal cancer associated with schistosomiasis developed earlier than cancer uncomplicated by schistosomiasis.

"3. Chronic schistosomiasis may induce mucosal ulceration, proliferation and polyp formation, creating an environment favorable to cancer development. Hence chronic schistosomiasis is one of the promoting factors of cancerous growth.

"4. Transitional changes between proliferative mucosa and cancerous lesions were found. The cancer growth might be of multicentric origin.

"5. The importance of careful and thorough examination of chronic schistosomal lesions was stressed.

"6. Carcinoma developing on top of chronic schistosomiasis was usually highly differentiated, metastasis occurring late and rarely. Early diagnosis and treatment of such cases are important."

Pesigan, T. P., Farooq, M., Hairston, N. G., Jauregui, J. J., Garcia, E. G., Santos, A. T., Santos, B. C. & Besa, A. A. **Studies on** *Schistosoma japonicum* **Infection in the Philippines. 3. Preliminary Control Experiments.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 2, 223–61, 12 figs.

"Among the measures used in attempts to control the snail host of *S. japonicum* in Leyte Province, Philippines, where the terrain is unsuited to the application of molluscicides, have been removal of vegetation in and around infested streams, drainage of waterlogged areas, filling low-lying areas with earth or flooding them, and digging fishponds in sluggish streams. Each of these measures is described in detail.

"Experiments carried out in rice-fields, which harbour great numbers of snails, have shown that improvements in rice-growing methods will not only markedly reduce the snail population but also double the rice yield.

"A campaign to promote the use of pit latrines encountered the serious difficulty that such latrines were not acceptable to the people. However, there is evidence that use of pit latrines does bring about a reduction in snail infection rates.

"No single control measure is recommended for all snail habitats, the choice of method depending on local circumstances; in many areas a combination of methods proved advantageous. It is felt that mass treatment of infected persons would not be fully effective until transmission is more thoroughly under control."

Komiya, Y., Schao, Y. L., Hsu, K. C., Yao, S. C., Sun, C. C. & Hsu, K. C. **The Molluscicidal Effect of Sodium Pentachlorophenate and Calcium Arsenite on** *Oncomelania hupensis*, **a Snail Host of** *Schistosoma japonicum* **in China.** *Japanese J. Med. Sci. & Biol.* 1958, Apr., v. 11, Nos. 1/2, 15–20.

" . . . P.C.P.Na was proved to have an equal activity against *O. hupensis* regardless of the countries where it was produced, and calcium arsenite, when applied either for 48 hours or 72 hours, showed the same effectiveness, provided that the soil of the habitat was sufficiently wet.

" P.C.P.Na showed to be more effective with less amounts than calcium arsenite in case of the 48 hours' application. The latter, however, is not soluble in water and such a character may give facilities for applying it as molluscicidal even when the adjacent water is utilized for domestic use or for fish culture. Calcium arsenate has an equal molluscicidal effect as calcium arsenite, but the latter is less expensive in China, and therefore this can be more practically applicable for this purpose, particularly in an endemic area where P.C.P.Na can be inapplicable because of danger to human beings or animals."

Gancarz, Z. **Studies on Schistosomiasis. I. Cercarien-Huellen-Reaktion and Precipitin Ring Test for Early Diagnosis and Criteria of Cure in Experimental Schistosomiasis japonica.** *Chinese Med. J.* Peking. 1958, Sept., v. 77, No. 3, 236–40. [18 refs.] **II. Comparative Study on the Activity of Sodium Salts of Penta-, Tetra- and Tri- Chlorophenate against** *Oncomelania hupensis*. *Ibid.*, 240–42. **III. Resistance of** *Oncomelania* **Snails to Sodium Penta-Chlorophenate.** *Ibid.*, 242–3.

I. " 1. Three groups of rabbits were inoculated with different dosages of cercariae of *Schistosoma japonicum*. Following the positive findings in CHR and PRT, a 2-day course of intensive treatment with antimony potassium tartrate was administered. When definite negative CHR and PRT occurred, the animals were reinfested and series of serologic tests were made. Finally most of the animals were autopsied.

" 2. Both CHR and PRT were positive in all experimental animals and proved to be reliable means of early diagnosis in experimental schistosomiasis. The advantage of serologic procedures over stool examination was confirmed.

" 3. Both CHR and PRT appeared to be reliable criteria for cure.

" 4. Correlation existed between the degree of infestation and intensity of serologic tests.

" 5. The intensity of serologic reactions increased with the course of infestation from the 2nd–15th week for CHR and from the 2nd–29th week for PRT; it decreased thereafter.

"6. Following successful treatment, CHR became negative within the 26th–45th week and turned to be positive within the 4th–6th week after reinfestation. PRT became negative within the 24th–37th week and positive again within the 4th–10th week. Both CHR and PRT showed a lower intensity after reinfestation than after the initial one.

"7. CHR and PRT might be negative in dying animals.

"8. A 2-day course of intensive treatment with antimony potassium tartrate in rabbits brought about a mortality of 33·3%. All the animals which survived the treatment were definitely cured."

II. Two experiments in which sodium pentachlorophenate, tetrachlorophenate and trichlorophenate were tested simultaneously against *Oncomelania hupensis*, in different dilutions, showed that the LD50 of the first was much lower than that of the second; and that the LD50 of the second was slightly lower than that of the third. In other words, pentachlorophenate is 2–4·5 times more potent than either tetra- or trichlorophenate.

III. More than 14,000 *O. hupensis* were used for experiments designed to find out if this snail could become resistant to NaPCP after repeated exposures to progressively increasing doses of this salt. There was a slight suggestion of acquired resistance in the results of the experiments; this resistance is thought to be very insignificant under the conditions of the experiments. *J. J. C. Buckley*

WANG, Wan-Li, WU, Yun-Yi, CHIANG, Po-Jen & MAO, Shou-Pai. **Immunological Studies in Experimental Schistosomiasis japonica.** *Chinese Med. J.* Peking. 1958, Aug., v. 77, No. 2, 121–8.

Experiments on acquired resistance in schistosomiasis give variable results. *Schistosoma mansoni*, or non-human species such as *Schistosomatium douthitti*, have usually been used, but little work has been done with *Schistosoma japonicum*. Animals are usually first infected with a small dose of schistosome cercariae and later with a big challenging dose. Immunity or resistance is suggested by their survival. In nature, however, such events must be very rare and repeated exposures or reinfection after successful treatment is usual. It is of interest, therefore, to study acquired resistance in repeatedly infected animals and the possibility of active immunization with antigenic substances.

Experiments were undertaken to this end. [The original should be consulted for the details.]

Repeated infections with *S. japonicum* cercariae in mice and rabbits resulted in the production of partial resistance as measured by the recovery of adult worms on sacrificing the animals. The degree of resistance acquired was correlated with the number of exposures.

In rabbits inoculated with 25–100 cercariae and reinfected 2 months

later, the size of the initial inoculum had no effect on the degree of resistance produced.

In rabbits infected with 100 cercariae and reinfected 1–4 months later, the degree of resistance was inversely proportional to the interval between successive inoculations.

Partial immunity as a result of repeated infections affected the development of schistosomes in later inoculations only quantitatively. Partial immunity persisted for 4 weeks in mice successfully treated.

Saline extracts of worms and cercariae given parenterally to mice resulted in only slight immunity. *W. E. Kershaw*

WYKOFF, D. E. **Studies on** *Clonorchis sinensis*. **III. The Host-Parasite Relations in the Rabbit and Observations on the Relative Susceptibility of certain Laboratory Hosts.** *J. Parasitology*. 1958, Oct., v. 44, No. 5, 461–6. [18 refs.]

"Metacercariae of *Clonorchis sinensis* shipped under refrigeration from Okayama, Japan, to the U.S.A., retained their viability for periods of at least 60 days after death of the fish host. Rabbits and guinea pigs were found to be equally susceptible to infection with this parasite, about one-third of the orally administered metacercariae developing to maturity. Rats were less susceptible, with only 6% development. An inoculum of 1000 metacercariae was lethal to guinea pigs, but rabbits were able to withstand even larger inocula.

"Egg production was detected an average of 22 days after infection in rabbits, and after an average of 20 days in guinea pigs. It was found that as few as 5 metacercariae given by mouth were capable of producing demonstrable infections in rabbits. Approximately the same percentage of development was found with inocula of from 10 and 1000 metacercariae. The average size of adults recovered did not appear to be influenced by the number of worms present.

"Attempts to infect snails of the family Hydrobiidae (*Fluminicola coloradoense*, *F. fusca*, *Gillia altilis*, and *Bulinus tentaculatus*) with *C. sinensis* were unsuccessful, but since it was not possible to maintain *F. coloradoense* in the laboratory, further studies may be required to determine whether this species is susceptible to experimental infection."

[For Part I, see this *Bulletin*, 1958, v. 55, 554.]

YAMAGUCHI, T., YOSHINO, K., SAKAMOTO, Y. & HIROSE, H. [**A Case of Subcutaneous Tumor occurred by Lung Fluke** (*Paragonimus westermanii*)] *Shikoku Acta Med.* 1958, Aug., v. 13, No. 2, 117–19, 2 figs. [In Japanese.] English summary.

Rey, L. *Fasciola hepatica* no gado, no Rio Grande do Sul. Investigações sôbre a possibilidade de ocorrência de casos humanos. [*Fasciola hepatica* **in Cattle in the Rio Grande do Sul. Investigations on the Possibility of Human Infection**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Oct., v. 9, No. 4, 473–83. [19 refs.]

The English summary appended to the paper is as follows:—

"The author made a survey of the present status of Fascioliasis in cattle and of the possibilities of its transmission to man, in the State of Rio Grande do Sul, Brazil.

"The prevalence of the disease in cattle, as registered in the past three years in the Slaughter-houses, for the whole State, is 2·24 percent among bovines and 4·25 percent among sheep, but much higher rates are found in some particular areas. The statistical data available for the last 38 years do not suggest that the disease is on the decline.

"The vector in the region is probably *Lymnaea viator* d'Orbigny, which is easily found in ditches and grassy ponds.

"No human cases of Fascioliasis were found by fecal examinations (methods of Faust & al. and Hoffman & al.) or intradermal tests with antigens of *Fasciola hepatica* and *Schistosoma mansoni.*

"The author concludes that the infestation of humans, although possible, is extremely difficult to occur, due to the habits of the population."

Hevia, H., Schenone, H., Klein, O. & Alarcon, R. Distomatosis cutánea asociada a erupción reptante. [**Human Cutaneous Fascioliasis associated with Creeping Eruption**] *Bol. Chileno de Parasit.* 1958, July–Sept., v. 13, No. 3, 57–9, 2 figs.

The English summary appended to the paper is as follows:—

"A human case of cutaneous fascioliasis associated with creeping eruption is presented.

"The creeping eruption was treated with a total dose of 12 grams of Diethylcarbamazine and a total disappearance of lesions was obtained. But the patient had shown a deeper cutaneous nodule which was not affected by this treatment. A biopsy of this nodule was performed and a juvenile specimen of *Fasciola hepatica* (Fig. 2) was found. The follow-up of the patient and a discussion are given."

[See this *Bulletin*, 1944, v. 41, 300.]

Dissanaike, A. S. & Bilimoria, D. P. **On an Infection of a Human Eye with *Philophthalmus* sp. in Ceylon.** *J. Helminthology.* 1958, v. 32, No. 3, 115–18, 1 fig. & 1 pl.

A specimen of *Philophthalmus* sp. was removed from the eye of an Indian Moor, a resident of Ceylon who made regular trips to South India

where he was accustomed to bathe frequently in a small stream frequented by ducks and crows. The worm was under a slight swelling 4 mm. above the limbus and could be seen moving rhythmically by a slit-lamp. After cocainizing and breaking the conjunctiva over the site, the worm came out partially and withdrew again. It emerged completely when the conjunctiva was pressed. 5 days later there were no signs of redness or irritation.

The live specimen was 3 mm. long by 0·96 mm. in maximum breadth; when fixed it was 1·56 mm. by 0·64 mm. The vitellaria were not distinguishable and, as only a single specimen was available, a specific diagnosis was not attempted.

The genus *Philophthalmus* Looss, 1899, is parasitic in birds and has only once before been recorded as a parasite of man, by Markovic (*V. Graafes Arch. Ophthal.*, 1939, v. 140, 515) in Belgrade. *P. lacrymosus* was found in gulls in Belgrade and the human infection was identified as this species.

Since nothing is known of the life cycle of any species of *Philophthalmus*, the mode of infection of the human eye can only be a matter for speculation. *J. J. C. Buckley*

Gemmell, M. A. **Cestode Problems of Domestic Animals and Man in the South Island of New Zealand.** *New Zealand Med. J.* 1958, Oct., v. 57, No. 321, 442–58, 2 maps & 1 chart. [15 refs.]

Faraco, F., Rodriquez, G. & Pagnotta, G. Su di un caso di cisticercosi diffusa. [**A Case of Diffuse Cysticercosis**] *Acta Med. Italica.* 1958, Jan., v. 13, No. 1, 5–9, 5 figs. [19 refs.]

Cohen, G. **Cyst-Wall Calcification in Intracranial Cysticercosis.** *South African Med. J.* 1958, Oct. 25, v. 32, No. 43, 1033–4, 4 figs.

"A case of proved intracerebral cysticercosis with definite radiological demonstration of cyst-wall calcification (a condition stated by some authorities not to exist) is presented, and the relative literature is summarized."

Donckaster, R. & Habibe, O. Contribución al estudio de la *Hymenolepis nana.* II. Ensayo terapéutico con Acranil, Hexylresorcinol, Papaína, Piperacina y Puromicina. [**Contribution to the Study of** *Hymenolepis nana.* **II. Therapeutic Trials with Acranil, Hexylresorcinol, Papaine, Piperazine and Puromycin**] *Bol. Chileno de Parasit.* 1958, July–Sept., v. 13, No. 3, 44–9. [20 refs.]

The English summary appended to the paper is as follows:—

"1. The therapeutic effects of Acranil, Papain, Puromycin, Hexylresorcinol, and Piperazine were tested in 112 *Hymenolepis nana* infected individuals.

"2. Parasitological controls were performed 10 days after ending the treatment by stool examinations, one every other day by Telemann's modified procedure. When a parasitological cure was obtained, controls were repeated every month till completing 3 series of stool examinations.

"3. Papain, Hexylresorcinol, and Piperazine were ineffective against *H. nana* infection at the doses used. Promising results although far from satisfactory were obtained with Puromycin as well as with Acranil.

"4. No important toxic symptoms were observed with any of the drugs employed. The most relatively serious toxic manifestations appeared upon the administration of Puromycin.

"5. It is concluded that no satisfactory therapy is as yet available for *H. nana* infection."

White, P. J. **Mortality from Hydatid Disease in Victoria, 1853 to 1956.** *Med. J. Australia.* 1958, Sept. 20, v. 2, No. 12, 378–81, 1 fig.

"There has been a marked decrease in mortality from hydatid disease in Victoria. The age-specific mortality figures show that crude mortality figures for Victoria in the period 1941 to 1950 are heavily salted by patients in the older age groups."

Berry, E. H. J. & Francis, R. S. R. **Multiple Hydatid Cysts of the Lung. Report of a Case.** *New Zealand Med. J.* 1958, Oct., v. 57, No. 321, 479–82, 6 figs. on 2 pls.

Hernández Vallados, R. Algunos aspectos epidemiológicos de la uncinariasis en México. [**Epidemiological Aspects of Hookworm Disease in Mexico**] *Bol. Epidemiológico.* Mexico. 1958, Jan.–Feb.–Mar., v. 22, No. 1, 1–9, 1 chart. [14 refs.]

The author discusses in considerable detail and with 4 illustrative tables and a graph, the epidemiological features of hookworm disease in Mexico, with some reference to its relationship to occupation. Comparisons between the triennium 1924–1926 and that of 1953–1955 show that the average annual number of deaths from hookworms in the first triennium was 143 in 17 states distributed unequally from Sonora in the north to Chiapas, Oaxaca and Tabasco in the south. 80 of these deaths (56%) occurred in Tamaulipas, 16 in Veracruz and 13 in Nayarit, and these 3 areas accounted for 77% of the total.

30 years later, the average number of deaths per year was only 36, in 15 states. Veracruz accounted for 15 and Chiapas for 7: Tamaulipas had fallen to only 0·3.

In the first triennium the death rate from hookworm disease was 0·94 per 100,000 and in the second 0·12, a fall of 87%. The highest rates in the first period were in Tamaulipas, Nayarit and Aguascalientes, respectively 25·45, 8·04 and 3·08, and in the second, Campeche and Chiapas (0·73 and 0·72). Between 1952 and 1956 only 8 states had more than 100 cases per year and only 4 had over 1,000: these were Veracruz, Tabasco, Oaxaca and Chiapas with an annual average of 12,670, 3,647, 2,274 and 1,396. Of the 22,551 cases registered in 1956, only 4 areas showed more than 1,000, namely Tuxtepec (Oaxaca), 2,362; Veracruz (Veracruz), 1,555; Villahermosa (Tabasco), 1,409; and Comalcalco (Tabasco), 1,085.

The distribution of hookworm disease is shown to be mainly along the Gulf coast and also more inland in parts of Veracruz, Oaxaca, Chiapas and Tobasco.

The incidence, quoted from many sources, seems to vary between 30% and 90% according to the area and its environment; and, as would be expected, is particularly high in rural areas.

The author discusses at some length the questions of age, sex, severity of the infection, its relationship to mining and environment generally and association with other parasites (notably *Ascaris* and *Trichuris* and to a lesser extent *Enterobius* and *Taenia*). He concludes that hookworm disease is not an important cause of death in Mexico; that there is not sufficient information on the specific problem of mining areas; that sex is not important in relation to infection, but that the disease is commoner in youths and adults than in children of school age who account for less than one-third of the cases; that poverty and bad environmental conditions are most important factors, as is the presence of other intestinal helminths. The familiar approach of education, sanitation and coordination in control is emphasized. The possibilities of intensifying the campaign by treating infected persons with tetrachlorethylene are noted.

H. J. O'D. Burke-Gaffney

Sasa, M., Hayashi, S., Tanaka, H. & Shirasaka, R. **Application of Test-Tube Cultivation Method on the Survey of Hookworm and Related Human Nematodes Infection.** *Japanese J. Exper. Med.* 1958, June, v. 28, No. 3, 129–37, 2 figs.

A method is described whereby faecal specimens are cultured so as to yield infective larvae of hookworms (*Necator americanus* and *Ancylostoma duodenale*), *Trichostrongylus* and *Strongyloides*, which can then be easily differentiated; this is a difficult procedure with a fresh faecal specimen. Half a gramme of faeces is smeared on a strip of filter paper 25 mm. × 150 mm. which is put into an 18 mm. diameter test-tube with 3 cc. of tap water. The test-tube is covered tightly and kept at 25°C. for over a week, when infective larvae are found at the bottom. These are killed

by heat and examined on a slide. The differentiation of the 4 kinds of infective larvae is illustrated and supplemented by a key. "A trained technician usually diagnoses one to two hundreds of specimens in 4 hours."

This method and two others (direct smear and flotation) were compared as to their efficiency in surveys of (a) coalmine workers in Kyushu and Hokkaido; (b) farmers in Amami-Oshima Island and (c) farmers in Okinawa. The results of these are tabulated.

(a) Of 5,278 patients positive for hookworms, 86·6% were detected by cultivation, 68·5% by flotation and 23·6% by direct smear. Of 1,995 cases of *Trichostrongylus* the percentages positive were 69·9, 57·8 and 21·7 respectively. Of 5,252 patients positive for *Ascaris*, 91·6% were positive by direct smear and 61·8% by flotation. Of 2,823 patients positive for *Trichuris*, 54·3% were positive by direct smear and 63·5% by flotation. *A. duodenale* was the predominant hookworm species in these mines. Only 6 cases of *Strongyloides* infection were recorded.

(b) Of 224 cases of hookworm, 94% were detected by cultivation, 86·2% by flotation and 26·8% by smear. Of 14 cases of *Strongyloides*, the percentages positive were 97·0 detected by cultivation and 35·8 by smear. Of 357 cases positive for *Ascaris* 63·3% were positive by flotation and 75% by smear. Comparable figures for *Trichuris* were 69·6% and 52·7% respectively. The incidence of *A. duodenale* was slightly higher than that of *N. americanus*.

(c) The 895 cases of hookworms were detected as follows: by cultivation, 97%; by flotation, 86%; by smear, 63·4%. Of 110 cases of *Strongyloides*, 99·1% were detected by cultivation, and 6·8% by smear. Of 141 patients positive for *Ascaris*, 64·5% were detected by flotation and 99·3% by smear. 27 patients were found positive for *Trichuris*, 66·8% by flotation, and 57·5% by smear. Here the incidence of *N. americanus* was higher (72%) than that of *A. duodenale* (46·4%).

These studies demonstrated the remarkable sensitiveness of the cultivation method in detecting hookworm and *Strongyloides*.

J. J. C. Buckley

TANAKA, H. **Experimental and Epidemiological Studies on Strongyloidiasis of Amami Oshima Island.** *Japanese J. Exper. Med.* 1958, June, v. 28, No. 3, 159–82, 7 figs. [48 refs.]

Two techniques are described for the detection of *Strongyloides* larvae in faecal specimens, (a) test-tube cultivation technique and (b) extraction technique. The former is identical with that described in the previous abstract [SASA *et al.*, above]; in the latter, 3 gm. of faeces are placed on a copper wire mesh screen which is placed in a Petri dish of warm water (50°C.) so that the centre of the screen touches the bottom of the dish. After incubating at 37°C. for half an hour the rhabditiform larvae

migrate from the faeces through the wire mesh and can be seen in the bottom of the dish. Comparison of these two techniques with the smear method and centrifugation showed them to be superior. The extraction method is especially useful when a rapid diagnosis is required.

Observations were made on the daily appearance and number of the different stages of *Strongyloides* in faecal cultures, namely, rhabditiform larvae, filariform larvae, free-living male and female adults. Measurements and illustrations are given of the various stages and inter-stages, their rate of growth, and the morphological changes, particularly in relation to the changing distances of various organs from the anterior extremity.

" Epidemiological surveys of strongyloidiasis were made among school children and the native inhabitants in Amami Oshima Island. Out of 3,741 pupils (5–18 years), 31 individuals (0·8%) were found to harbour *Strongyloides stercoralis*. The infestation of *Strongyloides*, hookworms, Ascaris and Trichocephalus by age-groups, by the types of residence whether urban or rural (comparison of Naze City with surrounding villages), and by the sex-groups were studied. The percentages of infestations of *Strongyloides* showed no significant differences between any of the groups, while hookworm infestation was higher in the older age-groups, especially in rural areas.

" In the examinations of 721 native inhabitants in the southern part of this island, 53 individuals (7·4%) were found to carry *Strongyloides*. The age and sexual distribution of the incidences of strongyloidiasis showed no great differences by the groups, while hookworm infestation indicated higher percentages at older age groups and in females than in males."

The author successfully infected himself by applying about 300 infective larvae of *Strongloides* to the left forearm. The course of the clinical manifestations in this unique experimental infection [which should be of great interest and value to clinicians] is illustrated diagrammatically and described in detail. The author's summary of this experiment is as follows: " Itchy eruptions occurred at the site of infection. The cough appeared after 6 days and lasted for 3 days. After 17 days of infection, disorder of alimentary tract, such as sensation of fullness, anorexia, abdominal dull and aching pains, diarrhea and tenesmus at times associated with mucous bloody discharge were successively experienced. Severe coughs appeared again after about 25 days. The larvae were first detected in stool on the 27th day. The clinical manifestations of alimentary tract lasted until the 39th day but dramatically disappeared by the administration of the drug, diethylcarbamazine." Other symptoms persisted, however, after the treatment for about 2 months but became infrequent. After 2 years few clinical signs remained, but larvae were still being evacuated.

Clinical observations were also made on 37 infected persons, most of whom were in the chronic stage. These are described in detail and the

results are tabulated. Some of these were treated with diethylcarbamazine or gentian violet; the former showed slight parasiticidal action, less than that of gentian violet. *J. J. C. Buckley*

CHABAUD, A. G. & LARIVIÈRE, M. Sur les Oesophagostomes parasites de l'homme. [**Oesophagostomes Parasitic in Man**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 384–93, 1 fig. [23 refs.]

The authors' summary in French is freely translated as follows:—

A description is given of an immature female *Oesophagostomum stephanostomum* which was removed from a subcutaneous nodule in a child at Dakar.

The present nomenclature of species of the genus *Oesophagostomum* is unsatisfactory and we think that the work of TRAVASSOS and VOGELSANG should be basically employed.

O. brumpti and *O. apiostomum* of certain authors are synonymous with *O. bifurcum* (Creplin, 1849).

O. apiostomum of other authors is synonymous with *O. aculeatum* (Linstow, 1879).

O. stephanostomum var. *thomasi* is synonymous with *O. stephanostomum* Stossich, 1904.

Three species have therefore been recorded from man:

O. stephanostomum (easily identifiable), African but also recorded in South America.

O. bifurcum (spicules less than 1·15 mm. long with non-alate extremity, 20 μ long), in Africa.

O. aculeatum (spicules more than 1·15 mm. long, with non-alate extremity, 40 μ long), in Asia.

We indicate reasons for believing that man is not an absolutely normal host for oesophagostomes; this would explain the gravity of certain cases and the abnormal habitats recorded. *J. J. C. Buckley*

SORESCO, Angela & PANAITESCO, D. Contribution à l'étude du phénomène d'éclosion des larves contenues par les oeufs d'*Ascaris*. [**Observations on the Hatching of Larvae in** *Ascaris* **Eggs**] *Arch. Roumaines Path. Expér. et Microbiol.* 1957, Sept., v. 16, No. 3, 415–28, 9 figs. [19 refs.]

The authors investigated the hatching of the mature eggs of *Ascaris lumbricoides* by immersing the eggs in different media and noting the effects of temperature and mechanical pressure. Rapid hatching and the immediate death of the hatched larvae occurred in physiological saline mixed with alcoholic chloral hydrate solution, and in serum mixed with sulphuric ether. Slow hatching (2 to 12 hours) with survival of the larvae for 2 or 3 days occurred in physiological saline alone, but in saline

mixed with trypsin, artificial gastric juice and artificial gastric juice and bile the hatched larvae lived for a few hours only. [No clear conclusions can be derived from experiments on pressure and temperature.]

The hatched larvae are enclosed in 2 membranes which are mostly easily seen at the head and tail of the larvae. *W. E. Kershaw*

PIRINGER, W. A. & MOTTA MONTES, A. Ascaris pneumonitis en conejos. [*Ascaris* **Pneumonitis in Rabbits**] *Archivos Med. Panameños.* 1956, July–Aug.–Sept., v. 5, No. 3, 219–25, 4 figs. German summary.

The following is a translation of the authors' summary:—

Introduction of *Ascaris lumbricoides* filariform larvae into rabbits by gastric intubation produces eosinophilic pulmonary granulomas.

This pulmonary lesion develops 4 to 8 days after intubation.

More than 35,000 mature eggs cause death in the rabbits intubated; with a smaller number introduced into the stomach, the animals show definite symptoms of the disease; with 4,500 eggs or less no pulmonary lesion is seen.

Increase of eosinophils in the peripheral blood is not very marked; nevertheless, infiltration of these cells in the intra-alveolar septa is well-marked.

Attention is drawn to the hypothermia which occurs during pulmonary infection with *Ascaris* larvae. *H. J. O'D. Burke-Gaffney*

FLOCH, H. & MAILLOUX, M. Action de la désoxybenzoïne sur les parasites intestinaux. [**The Action of Desoxybenzoin on Intestinal Parasites**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 322–5.

The authors treated at Cayenne 50 schoolchildren infected with one or more intestinal worms. The drug used was desoxybenzoin, in a dosage of about 7 mgm. per kgm. body weight by the mouth, either 2 tablets for children under 10 years or 3 for older children, daily for 7 days, 3 courses of treatment being given, separated by a week without treatment. There were no symptoms of intolerance. Stools were examined after the second and third treatments. [Details of the method by which the stools were examined are not given.]

Eggs of ankylostomes [species not stated] were seen in only 1 child before and after the 3 treatments and appeared in another child after treatment had begun; and the authors conclude that desoxybenzoin has little action on these worms. It also had no action on *Ascaris* in 32 children. It did, however, remove *Strongyloides* completely from 4 children after the third treatment. It also removed after the second treatment *Trichuris* from 9 of 17 children and after the third treatment from 11 of them.

MONTESTRUC (*Arch. Inst. Pasteur de la Martinique*, 1956, v. 9, 32) successfully treated 20% of patients with ankylostomiasis and 66·6% with schistosomiasis; PARODI *et al.* (*Presse Méd.*, 1956, v. 64, 1539) successfully treated 83% of patients with schistosomiasis, provided that the 3 treatments were given; and DESCHIENS *et al.* [this *Bulletin*, 1954, v. 51, 1073] successfully treated 66·6% of patients infected with *Schistosoma haematobium*. The last two papers confirm that the drug is not toxic.

G. Lapage

BRYGOO, E. R. La filariose humaine à Madagascar. [**Human Filariasis in Madagascar**] *Arch. Inst. Pasteur de Madagascar.* 1957, v. 26, 23–39, 3 maps. [18 refs.]

The author's summary in French is freely translated as follows:—

An historical review of filariasis in Madagascar is given and is followed by an account of our own studies on the subject in this island. A map of the distribution of filariasis has been made possible by the work of mobile hygiene groups. Hitherto only filariasis of the lymphatic system has been described and is due either to *Wuchereria bancrofti* or to a variety whose adult is unknown but whose microfilaria has been described under the name *Microfilaria bancrofti* var. *vauceli*. The latter has a nocturnal periodicity.

On the east coast incidences of over 20%, after a single examination, are common.

Three species of mosquitoes are vectors of the infective larvae under natural conditions, namely, *Anopheles funestus*, *Anopheles gambiae* and *Taeniorhynchus uniformis*. The role of *Culex fatigans* seems to be negligible.

The pathology is still not well known but elephantiasis of the limbs and hydroceles appear to be common.

The problem of filariasis in Madagascar has hardly been touched on. Much research remains to be done.

[The paper is well illustrated with tables and sketch maps.]

J. J. C. Buckley

DANARAJ, T. J., SCHACHER, J. F. & COLLESS, D. H. **Filariasis in Singapore.** *Med. J. Malaya.* 1958, June, v. 12, No. 4, 605–12. [14 refs.]

"1. Results of a survey of 902 persons in Singapore for microfilariae show an infection rate of 5·5%; *W. bancrofti* was the only species found.

"2. 130 cases of filariasis are analysed with regards to clinical signs exhibited, degree of eosinophilia and complement fixation reaction. Analysis of residential histories is believed to indicate an endemic origin of the infection in about 30% of the Indian and 80% of the Chinese and Malaya patients.

"3. A mosquito survey in which 1,152 *Culex fatigans* were examined for larvae of *W. bancrofti* showed an overall infected rate of 1·6% while 0·9% had infective (third stage) larvae."

[Detailed findings are shown in 6 tables.]

RACHOU, R. G. Distribuição geográfica das filarioses humanas no Brasil. [**Geographical Distribution of Human Filariasis in Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 79–100, 1 graph & 3 maps. English summary.

Wuchereria bancrofti and *Dracunculus medinensis* were introduced to Brazil from Africa; *Mansonella ozzardi* is indigenous. *D. medinensis* has a limited distribution, possibly controlled by factors affecting adversely the crustacean intermediate host. *W. bancrofti* has been reported as widely distributed throughout Brazil but the present author was concerned to determine not merely its distribution but to differentiate between places where it was being transmitted and where cases occurred only because of transmission experienced elsewhere in the territory. This approach was taken to define the scope of control organization which the public health service should develop. Blood surveys (20 cmm. samples) and entomological surveys (capture, and dissections for filarial infection, of *Culex p. fatigans*) were carried out extensively. Numerous tables and 3 maps record the incidence of microfilariae of *W. bancrofti* and *M. ozzardi* found in surveys from 1951 to 1955. Nearly 300,000 persons were examined. The tables show in general low microfilaraemia rates of usually less than 1% but as high as 14% in different localities. Infection and transmission are localized and mainly coastal, somewhat concentrated towards the north-east and the south, with numerous foci up the Amazon basin. It is usually urban, the vector being *C. p. fatigans*. The domestic habits and breeding of the mosquito account for the urban localization of transmission but it is not understood why the transmission of this parasite has not become commoner inland. Climatic factors throughout much of the country are not unfavourable to the extrinsic cycle of the worm in the mosquito. [The reader is left to presume that the mosquito is widely distributed.] The limitation of foci of transmission is presumed to be due to some combination of various factors. Characteristics of transmission foci are a temperature above 17°C., a relative humidity of 80%, and rainfall of 1,300 mm. (mean annual figures).

M. ozzardi is tropical and found almost exclusively in the Amazon region where microfilaraemia rates are commonly between about 10 and 20%, with a maximum of 30%. It is rural rather than urban. It is more widespread where it occurs than *W. bancrofti*. No commitment is made as to the vector of *M. ozzardi* in Brazil. Mean annual climatic data for areas where this infection occurs are: 24–27°C., 80–90% relative humidity, and 2,000–2,500 mm. rainfall. *D. S. Bertram*

Rachou, R. G., Costa, L. & Santos, D. Resultado de um inquérito de filariose bancroftiana em João Pessoa, capital da Paraíba, realizado em 1955. [**Results of a Survey of Bancroftian Filariasis in João Pessoa, Paraíba, Brazil, in 1955**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Oct., v. 9, No. 4, 523–5. English summary (7 lines).

3 of 10,503 people examined harboured microfilariae of *W. bancrofti* and 1 of 10,574 *Culex fatigans* dissected was positive.

Wang, Chung-Fang, Lin, Ch'ing-Lei & Ch'en, Wen-Hsiao. **The Mechanism of Microfilarial Periodicity.** *Chinese Med. J.* Peking. 1958, Aug., v. 77, No. 2, 129–35. [13 refs.]

To verify an assumption that microfilariae should tend to accumulate at the capillary bed where the blood flow is slowest, microfilarial counts were made of blood specimens (60 cmm.) taken simultaneously from artery (femoral), capillaries (cutaneous) and vein (brachial) of 10 filariasis (*W. bancrofti*) patients at 9 p.m., 6 a.m., 9 a.m., and 2 p.m. The total number of microfilariae occurring in the capillary blood of all 10 patients both at 9 p.m. and 6 a.m. was clearly greater than in either the arterial or venous blood, *viz.*: 9 p.m., capillary, 2,520; artery, 1,503; vein, 1,440; 6 a.m., capillary, 1,472; artery, 651; vein, 956. (The numbers present at 9 a.m. and 2 p.m. were too small to have any significance.) From a comparison of the number of microfilariae in venous and arterial blood at the different times mentioned, the authors find further confirmation that the lung is the only organ where the diurnal accumulation takes place.

The main basis of a new theory of the mechanism of periodicity is then put forward, namely, that there is a relationship between the size of the microfilariae and the periodicity. The dimensions are tabulated of 5 different species, in descending order of magnitude, together with the degree of associated periodicity, namely, *bancrofti* (pronounced periodicity, + + +), *loa* (moderate, + +), *malayi* (present, +), *ozzardi* (none), *perstans* (none). "If the capillary bed [of the lungs] can serve as a 'filter' for microfilariae, their sizes naturally would determine the ease with which they pass through." The fact that in a nocturnally periodic species a few microfilariae are sometimes found in day blood could be explained by their being smaller in size than the average and can slip through the capillary barrier of the lung at any time. To verify this point, measurements were made of *W. bancrofti* microfilariae in blood taken at different times. The results of this investigation (which are tabulated) show that the average size of microfilariae which appear in the daytime is smaller than that of those appearing at night.

"The question now is the mechanism that controls the diurnal accumulation and nocturnal liberation of microfilariae. Since periodicity has a

definite relationship with the size of microfilariae, it is evident that the size of pulmonary vessels has something to do with the passage or non-passage of the parasite. The pulmonary vessels are well-known for their contractility and distensibility under nervous control." Experiments were carried out with vagotropic drugs on a dog infected with *D. immitis* and on patients with *W. bancrofti*, to observe their immediate effect on the microfilarial count. The results showed that there was a decrease in the number of microfilariae after administration of vago-depressive atropine and an increase after pilocarpine and acetylcholine which are vago-stimulative. "It is well-known clinically that the vagus nerve is more active during sleep and more depressed in waking hours, probably due to the difference of cerebral cortical activities. . . . This may explain the nocturnal microfilarial periodicity and our experimental findings."

[This is an interesting paper and the new theory deserves further investigation, especially in regard to the non-periodic microfilariae of *W. bancrofti pacifica* and the diurnally periodic microfilariae of *Loa loa*. The authors' attempts to surmount these two awkward stumbling blocks are not very successful.] *J. J. C. Buckley*

ANTONIPULLE, P., DAVID, H. V. & KARUNARATNE, M. D. R. **Biology and Control of** *Taeniorhynchus* (*Mansonioides*) *uniformis* **Theobald, the Chief Vector of Rural Filariasis in Ceylon.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 2, 285–95.

The results of an investigation into the habits of *Taeniorhynchus uniformis* and the results of control experiments at Induruwa, 43 miles south of Colombo, are given in this paper. *Wuchereria malayi* was prevalent in the area. Dwellings and outhouses were sprayed with DDT water dispersable powder, giving a covering of 85 mgm. of insecticide per square foot.

The adult population of *T. uniformis* was reduced by spraying but infected mosquitoes were found 12 weeks after the first spraying, and 16 weeks after a second spraying (an interval of 31 weeks elapsed between the two treatments). The resting places of the adult mosquitoes were found to be damp, shaded and sheltered places away from dwellings, such as heaps of coconut husks, the sides of drains, and on walls and cement tanks. The adults fly into houses especially when the houses are lit by night-lamps, and the peak period of biting activity in houses and cattle sheds was found to be between 6 and 9 p.m. On nights of the full moon, however, the catching rate in traps was more or less constant from dusk to dawn, and it is suggested that the adults are most active in moonlight. An increase in mating activity was also noticed during nights of the full moon.

Egg masses, larvae and pupae of *T. uniformis* were recorded from 11 genera of plants other than *Pistia* and *Salvinia*. The grass *Isachne*

australis was especially important as a host plant for the early stages. This grass grows commonly in both cultivated and uncultivated rice fields, and the numbers of adult mosquitoes were found to increase with the onset of the rains and flooding of the rice fields. *B. R. Laurence*

FENG, L. C., MA, S. F. & LIU, W. T. **Further Observations on the Transmission of** *Wuchereria malayi* **by** *A. hyrcanus* **var.** *sinensis*. *Chinese Med. J.* Peking. 1958, Aug., v. 77, No. 2, 112–20, 9 figs. on 2 pls.

In the Kwangsi, Hunan and Hupeh provinces of Southern China, *Wuchereria malayi* is transmitted in the hilly regions by a race of *Anopheles hyrcanus sinensis* which breeds in terraced rice fields. Filariasis due to *W. malayi* was reported as serious in Hangchow and Yuhang county and studies in this area are described here.

Adult mosquitoes were collected, between May and October, from human dwellings and cow sheds, and females were then kept isolated in tubes for egg laying. Out of a total of 676 mosquitoes collected from human dwellings, 35% laid broad-decked eggs and 65% laid narrow-decked eggs. Out of a total of 466 mosquitoes collected from cow sheds, 92% laid broad-decked eggs and only 8% narrow-decked. This evidence suggested that there were two races of *sinensis* involved, one of which preferred human blood, laying narrow-decked eggs, and the other preferring animal blood and laying broad-decked eggs. Eggs intermediate between the two forms have been collected in the breeding places. [There is no detail of any egg measurements.]

Female mosquitoes, which were collected in 2 villages in Yuhang in July, where 51·3% of the human population were infected with pure *W. malayi*, were allowed to lay eggs and then dissected for filariae. The gonotrophic cycle was found to be 2 days. Of the mosquitoes collected in houses, 41% of 71 females laying broad-decked eggs and 61% of 134 females laying narrow-decked eggs were infected. The stages of development of filariae in both races were found to be the same, and the time for the complete development to infective larvae, in both, was 6 days. The authors conclude that both races are able to transmit *W. malayi*, but that the race laying narrow-decked eggs feeds more readily on man and consequently is the more important vector.

The two races were shown to differ morphologically also in the larval and adult stages. The mosquito that lays broad-decked eggs is larger, the palps are more shaggy, with two distinct narrow white bands, the white scales on the wing are yellowish and form a distinct spot on the wing fringe at vein 5·2, the propleural bristles are numerous (about 6–10), and the abdomen has distinct white spots. The smaller race, which lays narrow-decked eggs, has less shaggy palps with broader, sometimes confluent, bands, pure white scales on the wing and usually no spot at vein 5·2, propleural bristles 4–6, and the abdominal spots less

distinct. The larva of the larger race has an uninterrupted black median dorsal stripe from segments 1 to 8 of the abdomen, whereas this stripe is interrupted in larvae of the smaller race. It is concluded, from the distribution of narrow-decked and broad-decked eggs in the breeding places, that the smaller, anthropophilic race selects unpolluted shaded breeding places, whereas the larger zoophilic race prefers more exposed and slightly polluted water. It is suggested that the smaller anthropophilic race breeds more readily at higher altitudes. *B. R. Laurence*

BONNET, D. D. & CHAPMAN, H. **The Larval Habitats of** *Aedes polynesiensis* **Marks in Tahiti and Methods of Control.** *Amer. J. Trop. Med. & Hyg.* 1958, Sept., v. 7, No. 5, 512–18. [22 refs.]

Aëdes polynesiensis breeds in a variety of situations and effective control requires a knowledge of the possibilities. In Tahiti, where coconuts form the principal product, rat-eaten coconuts in particular provide numerous breeding places at a varying time after falling from the trees; rat control in this case also indirectly plays a part in mosquito control. Other breeding sites include rock holes, fallen leaves, tree holes and crab holes. Artificial breeding sites include fresh-water storage containers, commonly attached to houses in Tahiti and the Society group, and these can be protected by screening or the addition of a small quantity of kerosene to the water. Large tanks can be treated by introduction of larvivorous fish. Other artificial sources include car tyres, machinery parts, cans and bottles, canoes, animal drinking troughs and ant-guards in houses. The relative importance of various breeding sites varies from area to area and it is difficult to make a list of these in descending importance. The resistance to desiccation of the eggs of *A. polynesiensis* throws into importance the rock holes and crab holes as reservoirs of the mosquito when, after rainfall, almost all will be holding larvae. Control measures aim at the elimination of breeding sites near human habitation where possible and dealing appropriately with water containers that have a useful purpose. *E. R. Nye*

DUKE, B. O. L. & BEESLEY, W. N. **The Vertical Distribution of** *Simulium damnosum* **Bites on the Human Body.** *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 274–81, 1 fig.

The biting females of *Simulium damnosum* are attracted usually to the lower parts of the human body. In the Cameroons most females (98–100%) were attracted to the body below the waist of bait boys standing in the open, or on a platform 6 feet above ground, or sitting in a chair suspended 10–20 feet above ground. A man lying horizontally was bitten along all his body (52·5% of the females biting below the waist), and a man inclined head downwards at 45° was bitten mostly on

the upper parts of the body (95·5% of the females biting). Bait boys standing in tall vegetation, or with the upper part of the body protruding through a platform built 3½ feet off the ground, attracted rather more flies (4·6–15·4%) around the upper parts of the body compared with bait boys standing in the open (0–2%). The general conclusion is that the females bite predominantly those parts of the human body which are immediately above the substrate on which the body appears to rest. Occupations in which a man comes into association with *Simulium* among waist high vegetation, or in the water, may mean a higher proportion of bites on the upper parts of the body, and earlier invasion of the eyes by microfilariae. [See also this *Bulletin*, 1954, v. 51, 1279.]

B. R. Laurence

ONORI, E. Sulla terapia attuale dell'oncocercosi. [**Current Treatment of Onchocerciasis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Sept., v. 39, No. 9, 575–92. [30 refs.] English summary.

A general review and discussion.

IRIE, T. [**Studies on *Gnathostoma* in Eastern Area of Shikoku**] *Shikoku Acta Med.* 1958, Aug., v. 13, No. 2, 120–34, 13 figs. on 2 pls. [Numerous refs.] [In Japanese.] English summary.

Between 1955 and 1958 the author, from Tokushima University School of Medicine, Japan, studied *Gnathostoma spinigerum*, *G. nipponicum* and *G. doloresi* in eastern Shikoku.

In Kagawa Prefecture, *G. spinigerum* was found in the gastric walls of 6 of 83 cats and 11 of 632 dogs, these animals being natural final hosts. Third stage larvae were found in the muscles of 22 species of second intermediate hosts in Kagawa and Tokushima Prefectures, namely 6 fish, 2 amphibians, 2 reptiles, 11 birds and 1 mammal. The species are listed: one species of fish (*Cyprinus auratus*) and one bird (*Gallus gallus domesticus*) were new findings.

One specimen of *G. nipponicum* was found in 117 Japanese weasels (*Mustela sibirica itatsi*), the only known final host.

All of 21 Japanese boars (*Sus scrofa leucomystax*) harboured *G. doloresi* in the gastric wall.

8 larvae of *G. spinigerum* from a black-eared kite (*Milvus migrans lineatus*) were given intraperitoneally to a dog and fertilized eggs were found in the faeces 148 days later. At autopsy 150 days later, 4 adult worms (2 male and 2 female) were found in a tumour on the stomach wall.

4 larvae from a grass snake (*Natrix tigrina tigrina*) were given to another dog and a male worm was found in one of 2 tumours on the stomach wall 195 days later.

[See also this *Bulletin*, 1957, v. 54, 734.]

H. J. O'D. Burke-Gaffney

FERNANDEZ, E. & RODRIGUEZ, H. Incidencia de triquinosis en el Matadero Municipal de Santiago durante los años 1936 a 1957. [**Incidence of Trichinosis in the Municipal Slaughter House of Santiago from 1936 through 1957**] *Bol. Chileno de Parasit.* 1958, July–Sept., v. 13, No. 3, 53–4.

The English summary appended to the paper is as follows:—

"The A.A. report the incidence of pork infection by *Trichinella spiralis* in the slaughter house of Santiago for the period from 1936 to 1957. Since 1952, infection of pork flesh is performed by examining 3 diaphragm samples by means of a phototrichinoscope. The incidence of infection found for the last ten years was lower than 3 per mil."

DAVIS, D. E. & READ, C. P. **Effect of Behavior on Development of Resistance in Trichinosis.** *Proc. Soc. Exper. Biol. & Med.* 1958, Oct., v. 99, No. 1, 269–72. [13 refs.]

DEFICIENCY DISEASES

See also p. 362, PROC. NUTRITION SOC. **Nutrition and Climatic Stress.**

DAMIEAN-GILLET, M. **Conjunctival Lesions in Avitaminosis A. A Histopathological Study.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 233–8, 5 figs.

"The author reports the results of a superficial, macroscopical examination of the conjunctival lesions caused by vitamin A deficiency. The examination was followed by a complete, microscopical study of eleven biopsies of the lesions. There were changes in the cells of the mucous membrane and the submucous connective tissue. Cicatrized lesions with the same localization were also examined."

JOSEPH, Kantha, NARAYANARAO, M., SWAMINATHAN, M. & SUBRAHMANYAN, V. **The Metabolism of Nitrogen, Calcium and Phosphorus in Undernourished Children. 4. The Effect of replacing Rice in the Diet by Tapioca Macaroni on the Metabolism of Nitrogen, Calcium and Phosphorus.** *Brit. J. Nutrition.* 1958, v. 12, No. 4, 429–32.

"1. The metabolism of nitrogen, calcium and phosphorus was studied during 5 days in five pairs of girls aged 9–11 years, similar in age, height

and weight and fed on an inadequate poor vegetarian diet based either on rice or on tapioca macaroni composed of tapioca flour (60 parts), low-fat groundnut flour (15 parts) and semolina (25 parts).

"2. The mean daily N intakes on the rice diet and on the tapioca-macaroni diet were 4·53 and 6·24 g, respectively. All the children maintained positive balance. The daily retentions of N on the tapioca-macaroni diet and on the rice diet were 0·94 and 0·79 g, respectively, the difference being not significant.

"3. The mean daily intakes of Ca on the rice diet and on the tapioca-macaroni diet were 285·2 and 380·1 mg, respectively. All the children were in positive balance. The mean daily retention of Ca on the tapioca-macaroni diet (93·3 mg) was larger than that on the rice diet (28·5 mg), the difference, however, being not significant.

"4. The mean daily intakes of P on the rice diet and on the tapioca-macaroni diet were 546·8 and 562·4 mg, respectively. All the children were in positive balance. The mean daily retentions of P on the two diets were 83·4 and 106·6 mg, respectively, the difference being not significant."

Subrahmanyan, V., Bhagawan, R. K., Doraiswamy, T. R., Joseph, Kantha, Bains, G. S., Bhatia, D. S., Sankaran, A. N. & Swaminathan, M. **The Effect of Replacement of Rice in a Poor Vegetarian Diet by Tapioca Macaroni on the General Health and Nutritional Status of Children.** *Brit. J. Nutrition.* 1958, v. 12, No. 4, 353–8. [18 refs.]

"1. A feeding experiment extending over a period of 6 months was carried out on thirty-two girls aged 4–11 years in a boarding home in Mysore to assess the effect of replacing rice in a poor vegetarian diet by tapioca macaroni composed of tapioca flour (60 parts), low-fat groundnut flour (15 parts) and wheat semolina (25 parts) on the growth, general health and nutritional status of children.

"2. The children were paired according to initial height and weight and the members of each pair allotted at random to the rice and tapioca-macaroni groups.

"3. Values for weight, height, nutritional status, haemoglobin level and red blood cell count were obtained at the beginning and end of the experiment for the subjects in the control and experimental groups.

"4. There was no significant difference in the increase in weight, height, and red-cell count between the two groups.

"5. Seven children in the tapioca-macaroni group improved in nutritional status as compared with three children in the rice group. Further, two children in the rice group showed deterioration in the nutritional status, but none in the tapioca-macaroni group showed any deterioration."

PLATT, B. S. **Protein Malnutrition—a Note on Nomenclature.** [Abstract.] *Proc. Nutrition Soc.* 1958, v. 17, No. 2, xl–xli.

More than 50 names have been given to syndromes associated with absolute or relative insufficiency of protein in the diet. Protein deficiency is often associated with deficiencies of other nutrients. Kwashiorkor should not be equated simply with protein malnutrition.

R. Passmore

BERGOT, J. L. & BASCOULERGUE, P. R. Influence de l'alimentation sur la dysprotéinémie de l'Africain. [**Influence of Nutrition on Dysproteinaemia in Africa**] *Méd. Trop.* Marseilles. 1958, Sept.–Oct., v. 18, No. 5, 811–15. [20 refs.]

The authors have found a considerable hypoalbuminaemia and a corresponding hypergammaglobulinaemia in Africans. In 2,375 sera examined in Brazzaville, of which 504 came from infants, the mean protein level was 7·5 gm.% with 45% albumin and 27% gamma globulin. To determine the part played by nutrition a survey was made in three districts in Central Congo. The first, Mossendjo, was in a forest, the second, Mindouli, in grassland, and the third, Madingo-Kayes, bordered the sea. The *per caput* intake of protein per day was very similar in all three, namely 40, 48 and 45 gm. respectively. However, the intake of animal as opposed to plant protein was very different in all three. In the forest district it was 14 gm. per day, in the grassland region it was 10, and near the sea it was 28 gm. per day. Nevertheless, the serum protein was respectively 7·7, 7·5 and 7·8 gm. per 100 ml. and the gamma globulin levels were 3·6, 3·3 and 3·7 gm. per 100 ml. respectively. The role of protein intake was further investigated by supplementing the diet of schoolchildren daily with 50 gm. dried milk in one school, and with 50 gm. peanut oil in two others. After 3 months no significant change could be noted in the total serum protein level and in the proportions of albumin and gamma globulin. There was a rather higher level of gamma globulin in the three districts than had been found in Brazzaville, where the gamma globulin level had amounted to 2·6 gm. per 100 ml., about 1 gm.% less. This the authors relate to the greater severity of malaria in the outlying regions.

H. Lehmann

SMYTHE, P. M. **Changes in Intestinal Bacterial Flora and Role of Infection in Kwashiorkor.** *Lancet.* 1958, Oct. 4, 724–7, 2 figs. [19 refs.]

This is an interesting and valuable contribution to the literature of kwashiorkor. In the introduction evidence is presented which suggests that a diet deficient in protein may disturb not only the nutrition of the child, but also the intestinal bacterial pattern. By spreading to the small

bowel, bacteria may possibly cause diarrhoea, compete with the host for nutrients and vitamins and may also liberate toxins, which, in the presence of a disordered liver, contribute to the clinical picture.

A detailed bacteriological investigation was made of 33 patients in Cape Town. A great variety of organisms was found. The gastric juice was seldom sterile, septicaemia and pneumonia were common, as also were severe skin infections. *Staphylococcus aureus* was the pathogen most frequently found, but *Salmonella* and *Shigella* were also encountered. [It would be interesting to know if this high incidence of infections in kwashiorkor is peculiar to Cape Town.]

The patients were treated intensively with antibiotics as well as the usual dietary measures. The mortality was 15%, whereas the usual mortality in this hospital for kwashiorkor patients is 45%. It is only possible to admit patients who are seriously ill, which accounts for the high mortality.

The difficulty in assessing the results of treatment is stressed. During the "period of initiation of cure", the infant loses weight as the oedema disappears. This period lasted for an average of 8 days in these patients and was followed by a "period of recovery", when weight gains then varied from about ½ to 6 oz./day: the average gain was 1·66 oz./day.

R. Passmore

Demaeyer, E. M. & Vanderborght, H. La digestion et l'absorption des matières grasses au cours du kwashiorkor. [**The Digestion and Absorption of Fat in the Course of Kwashiorkor**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 135–48, 2 figs. [22 refs.]

Fat balance studies were carried out on 10 children with kwashiorkor. The diets contained at least 50 gm. of fat. In the first week absorption ranged from 69% to 85% (one patient 28%). With treatment absorption improved in all patients, but even after 8 weeks did not return to normal. The relative proportion of free fatty acids in the stools also increased with treatment. Fat absorption appeared to be improved when a patient was given Bicarnésine, an ester of carnitine, which is reputed to increase the production of pancreatic secretions. *R. Passmore*

Cravioto, J. **Protein Metabolism in Chronic Infantile Malnutrition (Kwashiorkor).** *Amer. J. Clin. Nutrition.* 1958, Sept.–Oct., v. 6, No. 5, 495–503, 9 figs. [20 refs.]

This paper is part of an attempt to explore the possibility that specific amino-acid deficiencies could be responsible for some of the clinical and biochemical findings in kwashiorkor. Levels of amino acids in the plasma are low in kwashiorkor. The lowest levels were found for tyrosine, valine and cystine. It is possible that there may be a specific deficiency of an enzyme which converts phenylalanine into tyrosine. *R. Passmore*

SANKALÉ, M. & LE VIGUELLOUX, J. Le bilan cyto-hématologique du Kwashiorkor. [**The Cyto-Haematological Pattern in Kwashiorkor**] *Méd. Afrique Noire.* Dakar. 1958, Oct. 1–15, v. 5, No. 19, 441–5, 6 charts. [17 refs.]

The authors have examined the peripheral blood picture and the bone marrow of 36 infants with kwashiorkor in Bamako, French Sudan. The Price-Jones curve usually showed the presence of macrocytic, normocytic and microcytic cells. Most numerous were macrocytic normocytic red cells. All the children were anaemic and in the bone marrow there was an inhibition of maturation of all formed elements, particularly of the red cells. The thrombocytes were normal in number. *H. Lehmann*

CATZEL, P., THERON, J. J. & PRETORIUS, P. J. **The Erythrocyte Sedimentation Rate in Kwashiorkor (with an Analysis of some of the Biochemical and Haematological Factors concerned).** *J. Trop. Pediatrics.* London. 1958, Dec. v. 4, No. 3, 98–111, 6 figs. [28 refs.]

An unusual feature of kwashiorkor is that the erythrocyte sedimentation rate is normal at the height of the illness and becomes abnormal as recovery begins. The authors have studied 90 Bantu infants in Pretoria. They followed erythrocyte sedimentation rate, and changes in haemoglobin level, packed cell volume, red cell count, as well as serum protein levels and serum cholesterol concentration.

There was a clear correlation between the fall of red cell count on recovery and the rise of sedimentation rate. The authors themselves recognize that an investigation of blood volumes might have shown that the increase of the blood volume—or rather, plasma volume—might outstrip the formation of red cells [this *Bulletin*, 1949, v. 46, 159], thereby causing a temporary "anaemia", which would be responsible for the raised red cell sedimentation rate. *H. Lehmann*

CLOSE, J. Les modifications chimiques et morphologiques des cheveux, accompagnant le kwashiorkor. [**The Chemical and Morphological Changes in the Hair, accompanying Kwashiorkor**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 95–102, 4 figs. on 2 pls. [10 refs.]

The proportion of cystine in the proteins from the hair of African children with kwashiorkor was found to be lower than in healthy controls. This finding confirms the observations of other workers. However, the hair of an Indian from Guatemala with kwashiorkor contained a normal amount of cystine, in agreement with other observations on the hair of patients in Indonesia and Central America [this *Bulletin*, 1955, v. 52, 78].

A possible explanation of this difference is as follows: the hair of Africans is curly and there is an appreciable diminution in diameter associated with kwashiorkor. Guatemalan hair is usually straight and there are much smaller changes in size in diseased hair. In wool the outer cortex contains most of the sulphur and the inner part is stated to be very poor. In Africans with kwashiorkor the hairs, besides getting smaller, also become straight and depigmented and lose their outer layer. By analogy with wool, this layer may be relatively rich in cystine and its loss may account for the differences in the chemical analysis of the normal and diseased hair.

R. Passmore

McLaren, D. S. **Involvement of the Eye in Protein Malnutrition.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 2, 303–14. [Numerous refs.]

This review of the literature relating to Asia, the regions of Africa, the Americas and Europe, draws attention to the fact that disorders of the eye are frequently found in patients with kwashiorkor. Keratomalacia is sometimes present, attributable to an additional deficiency of vitamin A. The correction of any vitamin A deficiency that may be present in patients with kwashiorkor is an important therapeutic and prophylactic measure.

R. Passmore

Demaeyer, E. M. & Vanderborght, H. **A Study of the Nutritive Value of Proteins from Different Sources in the Feeding of African Children.** *J. Nutrition.* 1958, July 10, v. 65, No. 3, 335–52, 3 figs.

Nitrogen absorption by members of a group of 18 African children, aged 3½ to 12 years, who were convalescent from kwashiorkor, has been studied. The basic diet consisted of rice, bread, banana, butter, palm oil, sugar and fruits. Supplementary foods rich in nitrogen were skim milk, beans and peanuts or peanut flour or soyabean flour. Retention of nitrogen was highest when skim milk was present. A combination of beans and peanuts has a higher supplementary value than peanut or soyabean flour alone.

R. Passmore

Macdougall, Lorna G. **A Case of Kwashiorkor treated with Maize Gruel and Aureomycin.** *East African Med. J.* 1958, Oct., v. 35, No. 10, 575–9, 1 fig.

"A case of kwashiorkor is described in which clinical improvement occurred on a diet consisting of maize and water gruel to which a 50 mgm. daily supplement of aureomycin was added.

"After five weeks on this regime there was almost complete loss of oedema, partial healing of skin lesions and marked improvement in appetite and mental outlook.

"Serial studies of the serum proteins by paper electrophoresis showed some interesting variations from the usual trend in recovering kwashiorkor.

"An attempt to study a control case on a maize gruel diet alone without aureomycin supplement had to be abandoned owing to rapid clinical deterioration which was arrested by the institution of a skimmed milk diet."

[See this *Bulletin*, 1958, v. 55, 203.]

ADAMS, C. W. M., FERNAND, V. S. V. & SCHNIEDEN, H. **Histochemistry of a Condition resembling Kwashiorkor produced in Rodents by a Low Protein-High Carbohydrate Diet (Cassava).** *Brit. J. Exper. Path.* 1958, Aug., v. 39, No. 4, 393–404, 9 figs. on 3 pls. [Numerous refs.]

This paper records a detailed study of the histology of mice and rats fed on a cassava diet, very poor in protein. There was atrophy of the pancreas, liver, salivary glands, stomach and ileum. Cells in all these organs showed a loss of stainable protein from the zymogen granules. It is concluded that these changes in cassava-fed mice resemble closely those found in patients with kwashiorkor. In both conditions, the organs with a rapid turnover of protein are predominantly affected.

The changes are illustrated in 18 photomicrographs. *R. Passmore*

WILGRAM, G. F., LUCAS, C. C. & BEST, C. H. **Kwashiorkor Type of Fatty Liver in Primates.** *J. Exper. Med.* 1958, Sept. 1, v. 108, No. 3, 361–70, 4 figs. on pl. & 2 text figs. [28 refs.]

4 male *Cebus* monkeys and 4 Rhesus monkeys have been fed artificial diets free from choline and betaine and low in methionine. Histological examination of the livers with fat stains revealed fine droplets of the lipids throughout the lobules, but the main site of fat accumulation was the periportal area. There the hepatic cells were laden with lipid. These changes could be prevented by adding choline to the diet.

R. Passmore

GILLMAN, T., CANHAM, P. A. S. & HATHORN, M. **Experimental Nutritional Siderosis.** *Lancet.* 1958, Sept. 13, 557–8, 3 figs. [23 refs.]

When a large excess of iron was added to the diets of rats, the amounts absorbed and retained in the tissues were much greater in those animals which received a poor diet of "mealie meal" than in those which received a good stock diet. Massive siderosis, especially affecting the liver, was found in those rats on the poor diet which received the iron. These experiments are consistent with the view that the siderosis, so

commonly found in Africans, is attributable, in part at least, to malnutrition. It is suggested that an intracellular metabolic order may promote the excessive uptake of iron. *R. Passmore*

HASHEM, M. **The Effects of Selenium in Soil on Mammalian Nutrition.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 3/4, 149–63, 26 figs. on 13 pls.

This paper describes the production of cirrhosis of the liver in rats by feeding them on diets to which 20 mgm. per kgm. of sodium selenite was added. If the diet was low in protein and high in carbohydrate, growth was retarded and a nodular cirrhosis developed after a few weeks. If the diet was high in protein and low in carbohydrate, growth was normal and hepatic changes developed later and were less marked. The histological picture of the livers of these rats resembled a form of post-haemorrhagic necrotic cirrhosis found among Egyptian infants. In both conditions vascular derangement associated with haemorrhages appeared to play an essential part in the evolution of the disease.

It is suggested that a combination of a diet low in protein and chronic selenium poisoning may be responsible for cirrhosis of the liver in Egypt. Unfortunately there appears to be no knowledge of the selenium content of Egyptian soils or of the foodstuffs grown on them. *R. Passmore*

SPRUE

ASENJO, C. F., RODRÍGUEZ-MOLINA, R., CANCIO, M. & BERNABE, R. A. **Influence of very Low-Fat Diets, with and without Gluten, on the Endogenous-Fecal-Fat Excretion of Patients with Tropical Sprue.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 347–52, 1 fig. [18 refs.]

The faecal excretion of fat was very low (less than 2·5 gm. per day) in patients with tropical sprue on a low fat diet (about 12 gm. per day). The endogenous faecal fat excretion was about the same order of magnitude as in healthy controls. Excretion was not increased if gluten was present in the diet.

In these patients, when the dietary fat was raised to 60–80 gm. daily, there was steatorrhea. Of the dietary fat, only about 50–75% was absorbed, although there were some variations. *R. Passmore*

HAEMATOLOGY

PATEL, B. D., PAREKH, J. G., JHALA, H. J. & SARAIYA, C. C. **Anaemias in Infants and Children. A Preliminary Report.** *Indian J. Child Health.* 1958, Oct., v. 7, No. 10, 639–46.

A study of 150 cases in India.

BÁEZ VILLASEÑOR, J.; GÓMEZ LEAL, A.; ROSILLO, J.; CHÁVEZ, A.; GARCIA, S.; CRUZ KROHN, J. Anemias: revisión de los casos del Hospital de Enfermedades de la Nutrición (1946–1955). I. Frecuencia y clasificación [**Review of Anaemias in the Hospital de Enfermedades de la Nutrición, Mexico, in 1946–1955. I. Frequency and Classification**] [BÁEZ VILLASEÑOR, GÓMEZ LEAL, ROSILLO, CHÁVEZ, GARCIA & CRUZ KROHN]. *Rev. Invest. Clin.* 1958, Jan.–Mar., v. 10, No. 1, 11–24, 6 figs. English summary. II. Anemias normocíticas normocrómicas [**II. Normocytic Normochromic Anaemias**] [GÓMEZ LEAL, GARCIA, CRUZ KROHN & BÁEZ VILLASEÑOR]. *Ibid.*, 25–40. [10 refs.] English summary.

This is a 10-year survey of anaemia seen in the Hospital de Enfermedades de la Nutrición in Mexico. Of 23,000 patients 6,854 (29·8%) had been anaemic. Of these only 70 had presented with macrocytic anaemia: 45 had nutritional macrocytic anaemia, in 13 it was associated with liver cirrhosis, in 7 with sprue, and only in 3 was a diagnosis of pernicious anaemia made. In the 2 remaining patients no definite diagnosis was reached. 872 patients had microcytic anaemia: in 106 no definite diagnosis was made, in 201 the cause was iron deficiency, and in the remainder chronic bleeding was considered the cause of the condition. In 47 uncinariasis was found to be the responsible infection. The great majority of patients (5,912 cases) had normocytic normochromic anaemias of which no less than 1,706 were caused by infections of various kinds. The second most frequent cause (1,484 patients) was malnutrition, and in only 227 patients was a specific haematological disorder diagnosed. 12 of these were haemorrhagic disorders, 18 patients had been suffering from haemolytic anaemias of various kinds, in 29 the diagnosis of pancytopenia was made, in 6 of these secondary to quinine; two other relatively frequent conditions had been leukaemia (99 patients) and lymphosarcoma (52 patients). *H. Lehmann*

DREYFUSS, F. & PINKHAS, J. **Search for Abnormal Haemoglobins in Oriental Jews.** [Correspondence.] *Lancet.* 1958, Nov. 29, 1180. [13 refs.]

In a search for abnormal haemoglobins in Oriental Jews by workers in Jerusalem, thalassaemia, elliptocytosis and an increased red-cell

susceptibility to haemolysis (with reduced glutathione content) have all been recorded.

The authors have now examined the haemoglobin of 397 Oriental and Sephardi Jews by paper electrophoresis. The patients came from 12 countries in different numbers, varying from 100 from Iraq to less than 5 from Afghanistan and Cochin; the countries of origin are listed.

No haemoglobin differing electrophoretically from haemoglobin A was found, except for a fleeting example of a slow moving fraction in a woman with severe macrocytic anaemia; this disappeared when she recovered.

Evidently abnormal haemoglobins, as defined in this way, are either absent or rare among Oriental Jews in Israel.

H. J. O'D. Burke-Gaffney

CERNICH, I. R., PIFFARETTI, M. L., SÍVORI, A. & RODRÍGUEZ NIETO, A. Talasemia. [**Thalassaemia**] *Semana Méd.* 1958, Sept. 25, v. 113, No. 13, 599–601, 620. [10 refs.]

A short general account and description of a case in Argentina.

ERLANDSON, Marion E., SCHULMAN, I., WALDEN, Beatrice & SMITH, C. H. **Chromium^{51} Elution from Hemoglobin and Intact Erythrocytes of Adults, Infants and Patients with Cooley's Anemia.** *Proc. Soc. Exper. Biol. & Med.* 1958, Oct., v. 99, No. 1, 173–5, 1 fig. [10 refs.]

"Accelerated rates of chromium^{51} elution from hemoglobin solutions containing fetal hemoglobin have been shown to be present in specimens obtained from an infant and from patients with Cooley's anemia. This acceleration has been shown to be directly related to the percent fetal hemoglobin present. Rapid rates of chromium^{51} elution could not be demonstrated to occur from intact labeled erythrocytes containing large amounts of fetal hemoglobin studied by the technic of dialysis."

BINGLE, J. P., HUEHNS, E. R. & PRANKERD, T. A. J. **Haemoglobin-H Disease.** *Brit. Med. J.* 1958, Dec. 6, 1389–90, 3 figs.

4 cases of haemoglobin H disease are described in two Cypriot families living in London. In 2 patients the red-cell survival and marrow turnover were determined along the same lines recently described in a study of thalassaemic patients [BAILEY and PRANKERD, this *Bulletin*, 1958, v. 55, 1163]. The uptake of ^{59}Fe was reduced over the marrow sites in the fourth and fifth lumbar vetebrae, but was increased in the shafts of the long bones. This can be interpreted as a reduction in marrow activity

per unit volume of marrow, but as an increase in total marrow volume due to a peripheral spread in the skeleton. The ^{59}Fe uptake over the spleen and liver showed no evidence of extramedullary red cell formation. The rate of ^{59}Fe appearance in the red cells was slightly increased. Half the time taken for the radio-active iron to reach equilibrium in the cells is normally $3{\cdot}1 \pm 0{\cdot}2$ days. In one case it was 2·7 days, and in the other 3·0 days. This can be interpreted as indicating a slightly increased output of red cells. The red cell survival was measured by labelling the circulating cells with ^{51}Cr. Normally half the time for the disappearance of radio-active chromium from the blood is 22–24 days. In one case it was almost normal in 20 days, but earlier there had been undoubted indirect evidence of haemolysis. In the other case the time was 13 days, which allows a calculation of 70 days for the mean cell life.

These findings are similar to those in thalassaemia which the disease closely resembles in clinical features and haematological findings. It is usually assumed that haemoglobin H is not found in the phenotype unless the person carrying a gene for its production has also inherited a gene for thalassaemia. In one case the propositus was a woman aged 68 who had a son without haemoglobin H or thalassaemia, who in turn had a child with haemoglobin H disease. According to the authors there was no evidence in the propositus's son or in his wife of thalassaemia—in particular there was no rise in the haemoglobin A_2 fraction in either of them. Nevertheless, the authors' data show that they discovered 2% foetal haemoglobin in the wife. Similarly the daughter of the other patient, though showing no haemoglobin H, was found at the age of 1½ years to possess the unusually large proportion of 5% foetal haemoglobin. *H. Lehmann*

VENOMS AND ANTIVENENES

DOERY, Hazel M. **The Separation and Properties of the Neurotoxins from the Venom of the Tiger Snake** *Notechis scutatus scutatus*. *Biochem. J.* 1958, Dec., v. 70, No. 4, 535–43, 5 figs. [26 refs.]

"1. Two types of neurotoxin have been separated from the venom of the tiger snake *Notechis scutatus scutatus* by means of adsorption on barium carbonate, low-temperature methanol-fractionation and chromatography on the Amberlite resin IRC-50.

"2. One type of neurotoxin is stationary during paper electrophoresis at pH 8·6; the other type is represented by a group of weakly anionic proteins.

"3. Both types of neurotoxin have been separated from significant amounts of the components responsible for the other main pathological

effects of the venom, i.e. the coagulating factor and the haemolysin, as well as the enzymes hyaluronidase, phosphatases and cholinesterase.

"4. The properties of the neurotoxins are described and discussed in relation to those of the neurotoxins of the venom of *Crotalus terrificus terrificus*."

TOXOPLASMOSIS

Martín Jiménez, R., Embil Puig, J. & Salas Panisello, F. Toxoplasmosis congénita. Aislamiento del *Toxoplasma gondii* en Cuba. Estudio clínico y experimental. [**Congenital Toxoplasmosis. Isolation of** *Toxoplasma gondii* **in Cuba**] *Rev. Kuba Med. Trop. y Parasit.* 1958, July–Dec., v. 14, Nos. 7/12, 42–52, 19 figs. [29 refs.] [Also in *Archivos Med. Infantil.* 1957, v. 26, No. 3.]

The first case in Cuba confirmed by isolation of *Toxoplasma*.

Gibson, C. L. & Coleman, Nell. **The Prevalence of** *Toxoplasma* **Antibodies in Guatemala and Costa Rica.** *Amer. J. Trop. Med. & Hyg.* 1958, May, v. 7, No. 3, 334–8, 2 figs. [14 refs.]

Sera of adult inhabitants of several localities in Guatemala and Costa Rica were tested by the Sabin-Feldman dye test for the presence of antibodies to *Toxoplasma*. [The original technique was used; the reaction was unfortunately regarded as positive in undiluted sera, and it is difficult to know how much significance to attach to the results, particularly as the range of dilution is not given in full.] 100 Maya Indians from Escuintla, Guatemala (1,000 feet in altitude, in hot lowlands) were 94% positive; 156 Costa Ricans (mostly white) from Turrialba (1,800 feet in hot lowlands) were 88% positive; 30 soldiers from the highlands of Guatemala (5,000 feet) were 50% positive. Figures from Tennessee, U.S.A., were invariably lower (35%). It is suggested as a result of these findings that the transmission of toxoplasmosis is facilitated by residence in a hot climate, and this idea is confirmed by the greater number of sera giving high titres in the hot localities. *P. C. C. Garnham*

Romaña, C. Intradermo-reacción con toxplasmina en personas de Resistencia (Chaco). [**Intradermal Reaction with Toxoplasmin in Residents of Resistencia, Argentina**] *An. Inst. Med. Regional.* Resistencia, Argentina. 1957, Dec., v. 4, No. 3, 293–5. French summary (4 lines).

17 out of 49 persons tested were positive.

TÁLICE, R. V., GURRI, J., ROYOL, J. & PÉREZ-MOREIRA, L. Investigaciones sobre la toxoplasmosis en el Uruguay. Sobrevida de *Toxoplasma gondii* en sangre humana "in vitro". [**Investigations on Toxoplasmosis in Uruguay. Survival of *Toxoplasma* in Human Blood *in vitro***] *An. Facul. de Med. Montevideo.* 1957, Sept.–Oct.–Nov.–Dec., v. 42, Nos. 5/6, 143–7. [17 refs.] English summary.

In view of the fact that *Toxoplasma* is known to invade the blood of some of its hosts, the authors have carried out experiments to determine whether this parasite is capable of surviving in human blood *in vitro*. For this purpose suspensions of toxoplasms from the peritoneal exudate of infected mice were mixed in various proportions with preserved human blood obtained from blood banks. The mixtures were kept at 5°C. for different periods of time and the viability and virulence of the parasites were tested by intraperitoneal inoculation of mice.

It was shown that under these conditions the toxoplasms survive *in vitro* for 50 days, without losing their virulence for mice. It is therefore conceivable that parasites from infected donors might similarly survive in blood used for transfusion, and the infection might be transmitted in this way to recipients. It is also suggested that laboratory strains of *Toxoplasma* could be conveniently maintained in human blood. *C. A. Hoare*

CÁRDENAS VÁSQUEZ, B. Reservorios del *Toxoplasma gondii*. [**Reservoirs of *Toxoplasma gondii***] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1958, Jan.–Mar./Apr.–June, v. 15, Nos. 1/2, 35–72, 3 figs. [52 refs.]

The English summary appended to the paper is as follows:—

"The author summarizes the morphology, biology and physiology of Toxoplasma gondii.

"The author makes a review of previous reports of the infestation of dogs, gray rats, guinea pigs, pigeons, birds and ectoparasites with T. gondii.

"The author tried to determine the incidence of infestation with T. gondii in supposedly healthy animals. He found T. gondii in dogs (4%), gray rats (1·5%) and domestic pigeons (3·70%) coming from Guayaquil city. T. gondii was demonstrated also in domestic guinea pigs from the Andine region (5·7%).

"Domestic mice, parakeets, dog fleas, rat fleas, rat ticks, and rat, pigeon and parakeets lice were free of T. gondii.

"A previous step in this work was the demonstration that laboratory mice and rats do not harbor T. gondii.

"In this paper are discussed the value and usefulness of the immunologic and parasitologic tests used to discover T. gondii reservoirs."

IZUTANI, T. [*Toxoplasma* **Antibody maintained by House Rats, Cattle, Horses, Fowls and Sparrows**] *J. Osaka City Med. Center.* 1958, Mar., v. 7, No. 3, 181–92. [26 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Sabin-Feldman's dye-test is performed in house rats, cattle, horses, fowls, and sparrows in an effort to detect the presence of Toxoplasma antibody in studying toxoplasmosis with the following results:

"1) Of the 158 house rats tested, 40 are positive in detection; 3·8 per cent positive at a titer of 1:16; 1·9 per cent positive at a titer of 1:64.

"On a species classification, of the 116 rats of Rattus norvegicus tested, 31 are positive (26·7 per cent); Rattus rattus show a positive rate of 21·5 per cent. On a sex classification, males show a slightly higher positive rate than females.

"2) Of the 115 cattle tested, 26 are positive (22·6 per cent) with positive rates of 18·3 per cent at 1:4 and 4·3 per cent at 1:16.

"3) Of the 59 horses tested, 12 are positive (20·3 per cent) with positive rates of 15·3 per cent at 1:4, and 5·1 per cent at 1:16. Females show a higher positive rate than males for cattle and horses.

"4) Of the 197 fowls tested 42 are positive (21·3 per cent) with 33 fowls positive (16·8 per cent) at 1:4, and 9 fowls positive (4·6 per cent) at 1:16. Females show a higher positive rate than males.

"5) Of the 100 sparrows tested 22 are positive with the description of 15 per cent positive at 1:4 and 7 per cent positive at 1:16. Females show a markedly higher positive rate than males.

"6) Generally low antibody titers are found throughout the present experimentation. This finding is considered due to a generally accepted subclinical infection of toxoplasma among these hosts examined."

THIERMANN, Erica, NAQUIRA, F. & NIEDMANN, G. Contribución al estudio serológico de la toxoplasmosis. II. Reacciones de Sabin-Feldman y de fijación del complemento para la toxoplasmosis en muestras de sangre provenientes de adultos con sífilis comprobada. [**Contribution to the Serology of Toxoplasmosis. II. The Sabin-Feldman and Complement-Fixation Reactions in Blood Samples from confirmed Syphilitic Adults**] *Bol. Chileno de Parasit.* 1958, July–Sept., v. 13, No. 3, 50–52.

The English summary appended to the paper is as follows:—

"1.—Dye-test and complement fixation test for toxoplasmosis were performed in 100 blood specimens of syphilitic adults, hospitalized in Santiago.

"The dye-test was positive in 37% of the sera (titers 1:16 to 1:256), and 5% gave a positive complement fixation test. Positive results for the complement fixation test coincided with positive dye-test titers.

"2.—The incidence of positives (both dye-test and complement fixation

test) observed in the syphilitic group was not higher than in 131 healthy blood donors of similar age, living in the same city.

" 3.—In 283 blood specimens of individuals suspected of Toxoplasmosis, the standard Kahn reaction was positive in a higher percentage in those cases where the dye-test and complement fixation test were both positive, than in those cases where the toxoplasmosis tests were negative. This higher percentage of standard Kahn reaction in cases where an active toxoplasmosis is suspected may be due to inspecific reactions, although this cannot be ascertained at present with the data available.

" 4.—The authors concluded that syphilitic antibodies do not interfere with the dye-test and complement fixation test for toxoplasmosis. The possibility of nonspecific standard Kahn reactions in sera with positive dye and complement fixation tests for toxoplasmosis is suggested."

[See this *Bulletin*, 1958, v. 55, 1275.]

LITTLE, A. M. K. **Cerebral Calcification and Choroido-Retinitis due to Toxoplasmosis. Report of a Case.** *New Zealand Med. J.* 1958, Oct., v. 57, No. 321, 478–9, 1 fig. on pl.

BIMMER, E. & MOHR, W. Therapie-Versuche bei experimenteller Mäuse-Toxoplasmose. [**Chemotherapeutic Trials in Experimental Toxoplasmosis in Mice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 225–34. [15 refs.]

Experiments by EYLES *et al.* [this *Bulletin*, 1953, v. 50, 158, 980; 1956, v. 53, 655; 1958, v. 55, 318] with antibiotics, sulphonamides and related compounds, alone or in combination with Daraprim [pyrimethamine], have shown that these substances are effective against *Toxoplasma* infection in mice. Similar experiments have been carried out by the present authors in which mice of 25 gm. were infected intraperitoneally with 20,000 parasites of a Dutch strain Bk or strain La (Westphal) of *T. gondii*. The serum of the host animals was first tested and found negative in the Sabin-Feldman dye test and in the complement-fixation test. Treatment was started on the day of infection or on the previous day. Suitable control animals uninfected and treated with drug as well as those untreated and infected were used. At death stained smears of organs were examined. When an animal survived infection for 42 days, serological tests were made on its serum and suspensions of its brain and liver were used to inoculate other mice and determine whether viable parasites were present. Daraprim proved somewhat toxic to mice. In one experiment 50% of mice receiving a total of 11·25 mgm. of the drug within 5 successive days were cured. In tests with Solu-Supronal, a mixture of 2 sulphonamides, a dosage of 16·7 mgm. on each of 6 successive days suppressed the infection. When Daraprim and Supronal were used in combination, 6 mgm. of the former and 66·8 mgm. of the latter being

given during a 4-day period, the drugs proved too toxic. In another series, 4 mgm. Daraprim and 45 mgm. Supronal administered over 10 days gave rise to 60% of cures. Besides recognizing that these 2 drugs are themselves toxic, the authors suggest that such toxicity may be enhanced by the nature of the infection or by breakdown products of destroyed organisms. They note that immunity appeared to be absent in animals apparently cured. *J. D. Fulton*

DERMATOLOGY AND FUNGUS DISEASES

O'Connor, H. Les mycétomes en Afrique Occidentale Française. [**Mycetomas in French West Africa**] *Méd. Trop.* Marseilles. 1958, Mar.–Apr., v. 18, No. 2, 245–59, 4 figs. [14 refs.]

Bèzes, H., Goudoté, E. & Zinsou, R. L'aspect chirurgical des mycétomes à Dakar (à propos de 38 observations). [**Surgical Aspects of Mycetoma in Dakar. An Account of 38 Cases**] *Méd. Afrique Noire.* Dakar. 1958, Sept., 16–30, v. 5, No. 18, 416–19, 13 figs.

Cleve, E. A. Coccidiomicosis residual. [**Residual Coccidioidomycosis**] *Archivos Med. Panameños.* 1956, July–Aug.–Sept., v. 5, No. 3, 208–18, 5 figs. [17 refs.]

A discussion based on 30 cases, with notes on 6.

Hunter, R. C., Jr. & Mongan, E. S. **Disseminated Coccidioidomycosis treated with Amphotericin B.** *U.S. Armed Forces Med. J.* 1958, Oct., v. 9, No. 10, 1474–86, 4 figs.

Amphotericin B is an antibiotic derived from a species of *Streptomyces* found in soil from the Orinoco river basin and has been shown to possess antifungal properties for a wide variety of organisms, including *Coccidioides immitis.* The poor absorption of this drug by mouth has led to preference for the intravenous route. Toxicity by the intravenous route (nausea, vomiting, chills and fever) necessitates slow infusion and limited dosage.

The acute pulmonary form of coccidioidomycosis generally runs a benign, self-limited course and offers no serious therapeutic problems. Occasionally, a residual granuloma or cavity in the lung requires surgical removal, but the majority are asymptomatic and yield to treatment.

The disseminated form is relatively rare and is more serious and has a mortality of almost 50%. In the past 30 months the authors treated 14 patients with disseminated coccidioidomycosis, 5 of whom died. In one patient the course was fulminating and death occurred 2 weeks after

the onset: others have recovered spontaneously [this *Bulletin*, 1958, v. 55, 577].

4 patients, with the disseminated form, were treated with amphotericin B, 1 orally and 3 intravenously. The usefulness of the oral drug was not determined. The 3 patients on the intravenous preparation were treated for periods of 3 to 12 months. All improved while on therapy. Amphotericin B, administered intravenously, regularly caused chills, fever, anorexia and nausea. Azotaemia occurred once or more times in each patient on intravenous therapy, but subsided when treatment was stopped for 1 or 2 weeks. The water-soluble salt was dissolved in 5% dextrose water to a concentration of 1 mgm. per 10 ml. and infused slowly, over a period of 6 hours to a maximum dose of 1 mgm./kgm. daily. The unfavourable reactions were minimized by limiting the dose to 50 mgm. given every other day immediately after supper. 7 coccidioidal abscesses in 2 of the patients were injected directly with 20 to 25 mgm. of amphotericin B dissolved in 2·5 ml. of water. 2 were injected once, 4 twice, and 1 three times, the injections being one week apart. The abscesses had been present for several months and were either stationary, or increasing in size. The response was uniformly favourable and fluctuation disappeared in 3 to 6 weeks.

Amphotericin B appeared to be an effective agent for the treatment of disseminated coccidioidomycosis. Its toxicity has limited the dosage and therefore probably the effectiveness. Full case histories of the 4 patients are given. *Philip Manson-Bahr*

ALVAREZ, P. J. & BARNOLA, J. Paracoccidioidomicosis en un niño de seis años. [**Paracoccidioidomycosis in a Child aged Six Years**] *Archivos Venezolanos Puericult. y Pediat.* 1958, Jan.–Feb., v. 21, No. 67, 57–70, 4 figs. on 2 pls. [22 refs.]

TROPICAL OPHTHALMOLOGY

See also p. 344, DAMIEAN-GILLET, **Conjunctival Lesions in Avitaminosis A. A Histopathological Study.**

MANN, Ida. **Trachoma in Australasia.** *Rev. Internat. du Trachome.* 1958, v. 35, No. 3, 261–74, 1 map.

The author undertook ophthalmic surveys of the Kimberley Division, the Eastern Goldfields and of the south-west portion of Western Australia, and of the territories of Papua and New Guinea. Her conclusions were as follows:—

"1. The idea that Australasia was relatively free from trachoma has been shown to be fallacious by four extensive surveys recently carried out in Western Australia and in the Territories of Papua and New Guinea.

"2. The incidence of trachoma was found to have little relation to climate, diet, race, or state of nutrition.

"3. The incidence of trachoma was found to be related to a low standard of hygiene.

"4. The severity (as evidenced by the rate of blindness among trachoma cases) was found to have little correlation with the percentage incidence.

"5. The spread of trachoma was in most instances demonstrated to be through personal contact. Insect vectors were not universally or even certainly implicated.

"6. Areas with secondary infection and areas with trachome pur were found. The end results without treatment, were better in the latter. Epidemic muco-purulent conjunctivitis was however, more common among white children though trachoma was less common among them than among the coloured races.

"7. The overall percentage incidence in the whole area, in all races was approximately 43%." *D. P. Choyce*

Baquerizo Amador, L. Trachoma en el Ecuador. I. Diagnóstico de laboratorio. [**Trachoma in Ecuador. I. Laboratory Diagnosis**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1958, Jan.–Mar./Apr.–June, v. 15, Nos. 1/2, 17–20, 4 figs. English summary (6 lines).

The second case recorded in Ecuador.

Mitsui, Y., Hanabusa, J., Fukushima, S., Sakanashi, M. & Nishiyama, S. **Treatment of Trachoma with Erythromycin-Sulfacetamide Ointment (CT-887).** *Antibiotic Med.* New York. 1958, Oct., v. 5, No. 10, 586–92, 7 figs.

"Two cases of acute trachoma and 69 cases of chronic trachoma were treated with erythromycin-sulfacetamide combination ointment. This was compared with the effect of erythromycin alone.

"Two cases of acute trachoma and 58 of the chronic cases (84 per cent) were cured by treatment for eight weeks, though a clinical cure resulted some time after the end of treatment in most of the chronic cases.

"The combination of erythromycin with sulfacetamide was slightly superior to erythromycin alone, particularly in the acute stage cases.

"No side effects, such as allergic manifestations, were observed in the present series of cases."

HEAT STROKE AND ALLIED CONDITIONS

PROC. NUTRITION SOC. 1958, v. 17, No. 2, 167–97, 5 figs. [Numerous refs.] **Nutrition and Climatic Stress.**

It is commonplace that on cold days we feel hungry and during a heat-wave appetite may be depressed. Any traveller knows that the food habits of people vary with the climate. Yet there is very little accurate knowledge of the effect of climate on nutritional requirements. This report of a symposium is useful, for the speakers set out clearly what is known and, perhaps more important, what is not known about the subject. Each communication has a good bibliography.

T. BEDFORD discusses very briefly the indices of climate and points out that there is no satisfactory method for a full appraisal of climate. Indeed he suggests that it may be impractical to attempt too precise a measure. The classification of climates into 7 groups, which is used in deciding upon military clothing requirements, has proved simple and practical.

H. E. LEWIS and J. P. MASTERTON describe sledging rations. Most men when sledging need 4,500 to 5,000 Cal./day. Practical rations for this purpose are given.

R. H. FOX reviews the effects of heat. Apart from the extra requirements of water and salt to make good losses in the sweat, there is little definite knowledge. Recent studies provide no evidence that the energy required to perform standardized tasks is increased by moderate heat. Reliable estimates of the total losses of nitrogen and iron that may occur during profuse sweating are lacking. In the tropics the prime causes of deficiency diseases are poverty and ignorance, but heat stress may play some part, albeit a small one, about which we should know more.

R. E. JOHNSON and F. SARGENT record some of the results of their trials of survival rations, carried out for the United States Air Force. In these trials men were observed under a variety of nutritional and climatic conditions and their conclusions are based on a study of 8,698 subject-days. They give nomograms from which the requirement for water and calories for different grades of work at various temperatures from 0 to 100°F. can be read. In their opinion there is good evidence to support the orthodox view that cold increases caloric requirements. They also produce evidence, published here for the first time, that cold *per se* is ketogenic. A close correlation exists between the ketogenicity of a regimen and environmental temperature.

J. D. FINDLAY discusses climatic stress in cattle and records the evidence that when the temperature rises above a critical level, grazing stops or is reduced. The raising of herds of dairy cattle relatively resistant to heat stress is an important problem, practical for human nutrition in the tropics.

K. L. BAXTER gives an account of the critical temperature of animals (including man) below which body temperature cannot be maintained

and discusses caloric requirements in relation to it. The requirements for specific nutrients as well as for calories are increased in the cold. In general, however, the greatest direct effect of low temperature is a calorie deficiency.

It was a pleasure to attend this Symposium and the written report also makes good reading. It will become a standard reference for the many people who have a practical interest in feeding either men or beasts in harsh climates.

R. Passmore

MISCELLANEOUS DISEASES

EDOZIEN, J. C. **Chemical Evaluation of Hepatic Function in Nigerians.** *J. Clin. Path.* 1958, Sept., v. 11, No. 5, 437–40, 2 figs. [22 refs.]

This paper records the range of findings for 200 Nigerians in each of 14 chemical measurements, reputed to be related to the normal function of the liver; the high level of gamma globulin in the serum of Africans is not considered to be evidence of hepatic cell damage. With a suitable combination of chemical tests, liver damage can be detected and assessed.

R. Passmore

ROBINSON, P. **Infantile Liver Cirrhosis: Case for a Toxic Etiology.** *Indian J. Child Health.* 1958, Sept., v. 7, No. 9, 611–15. [12 refs.]

Infective hepatitis and under-nutrition are common causes of liver damage, but the evidence that they are responsible for infantile liver cirrhosis is unsatisfactory. The author presents circumstantial evidence collected from the literature and also from a list of indigenous drugs of India, which suggests that the disease can be attributable to a toxic agent, perhaps one of these drugs. [This is a useful working hypothesis, which should be capable of verification by careful clinical study.]

R. Passmore

BROOKS, E. A. V., JAMES, G. A. & STUBBER, L. A. **Favism in Western Australia.** *Med. J. Australia.* 1958, Oct. 4, v. 2, No. 14, 455–8, 1 fig. [11 refs.]

" A girl, aged three years, presented with acute attacks of haemolysis associated with the ingestion of uncooked broad beans.

" No red cell abnormality could be detected, but the presence of a weak warm haemolysin was demonstrated in her acidified serum.

" Her parents were born in the Dodecanese Islands, and two members

of the family showed mild changes in their red cells similar to those found in Mediterranean anaemia trait.

"The theories of the mechanism of the haemolytic process, namely a direct toxic action, an allergic phenomenon or an enzymatic defect of the red cell, are briefly discussed."

SCHWARTZ, C. J. **Kuru.** [Correspondence.] *Med. J. Australia.* 1958, Jan. 25, v. 1, No. 4, 124–5.

Schwartz has been impressed with the striking similarity between the clinical picture of kuru [this *Bulletin*, 1958, v. 55, 1048] and that of neurolathyrism, and he quotes a description of the latter by SELYE. He suggests that the people in the areas where kuru occurs may have been eating various types of lathyrus grains, and that such a possibility should be investigated. *Charles Wilcocks*

BRES, P. Analyse des examens bactériologiques pratiqués pour 21 cas de mélioïdose observés au Sud-Vietnam. [**Results of Bacteriological Examination of 21 Cases of Melioidosis seen in South Viet-Nam**] *Méd. Trop.* Marseilles. 1958, July–Aug., v. 18, No. 4, 694–707, 1 chart. [10 refs.]

The author reports on 21 cases of *Malleomyces pseudomallei* [*Pfeifferella whitmori*] infection encountered in Saigon during 1953–54. The pathogen was isolated in each case.

Africans, Europeans, and Asians were infected without evidence of racial difference but with a variety of clinical forms. In 12 cases there was septicaemia, often with localization in lungs, urinary tract, spleen, liver or pleura. The other 9 patients showed only localized infection in such sites as lungs, urinary tract, subcutaneous muscle, or meninges. Clinical symptoms varied considerably and there was a danger of misdiagnosis as tuberculosis, lung abscess, *Escherichia coli* infection of the urinary tract, and so on.

Serological methods, particularly agglutination, haemagglutination, and complement fixation enabled an accurate diagnosis to be made but direct culture of the organism was sometimes positive before the patient's serum showed the presence of antibody. In one case, which gave repeated positive isolations from urine, serological tests were consistently negative.

The organism grew on ordinary laboratory media and was readily identified but the author draws attention to the need for a really thorough bacteriological investigation. The pathogen was isolated by blood culture and from sputum, pus, urine and cerebrospinal fluid. Of these, blood culture was the most consistently positive giving 12 isolations from 21 patients but it is noted that it was unusual for two blood cultures to be

positive from the same patient and the author emphasizes that repeated attempts at isolation should be made from as many sources as possible.

In sputum and urine, isolation was often complicated by the presence of staphylococci and Gram-negative rods of the *Achromobacter* and *Pseudomonas* type. In such cases guineapig inoculation helped in isolation of the pathogen.

In only 3 cases did the *Malleomyces pseudomallei* show increased resistance to chloramphenicol after treatment of the patient with this antibiotic. Even where resistance appeared it proved to be transitory in nature. *John R. Norris*

Dannenberg, A. M., Jr. & Scott, Eva M. **Melioidosis: Pathogenesis and Immunity in Mice and Hamsters. II. Studies with Avirulent Strains of** *Malleomyces pseudomallei.* *Amer. J. Path.* 1958, Nov.–Dec., v. 34, No. 6, 1099–1121, 9 figs. on 4 pls. [42 refs.]

PARASITOLOGY: GENERAL

Ricci, M. Notizie sul parassitismo intestinale dell'uomo nel territorio del Parco Nazionale d'Abruzzo. [**Human Intestinal Parasites in the National Park of Abruzzi**] *Riv. di Parassit.* Rome. 1958, Apr., v. 19, No. 2, 91–112. English summary.

The author describes the results of a survey carried out in 1953 on human intestinal parasites among the inhabitants within the territory of the National Park of Abruzzi, in Italy. The survey was based on faecal examinations of all the subjects, in addition to which children under the age of 12 were also examined for enterobiasis by Graham's Cellophane method. Among the 653 children in this age-group the incidence of infection was 32·47%, with a predominance in the 6–12 years age-group. The prevalence of other parasites was studied in 453 persons, whose ages ranged from 1 to 74 years. The infection rate in 237 children aged 1 to 12 years was 77·64%, the 6–12 years age-group having a higher incidence (88·39%) than the 1–5 years age-group (68%). Among the 216 older persons 66·2% were infected.

The percentage of different parasites detected was as follows (the first figure refers to children up to 12 years old, the second to older people): *Entamoeba coli* (14·77; 21·3), *E. histolytica* (0·42; 0), *Endolimax* (2·11; 1·39), *Iodamoeba* (7·17; 10·19), *Chilomastix* (0·42; 0), *Retortamonas* (0; 0·46), *Trichomonas* (0; 0·46), *Giardia* (30·38; 8·8), *Hymenolepis nana* (0; 0·46), *Ascaris lumbricoides* (40·08; 16·67), *Enterobius vermicularis* (0·84;

0), *Trichuris trichiura* (42·19; 43·98). Mixed infections were present in 52·72% of children under the age of 12 and in 40·56% of the older subjects. *C. A. Hoare*

JÍROVEC, O. & ROSICKÝ, B. Erfolge und Perspektiven der humanen Parasitologie in der Tschechoslowakei. [**Results and Perspectives of Human Parasitology in Czechoslovakia**] *Ztschr. f. ärztl. Fortbildung.* 1958, Oct. 1, v. 52, No. 19, 821–6.

PARFITT, J. W. **A Technique for the Enumeration of Helminth Eggs and Protozoan Cysts in Faeces from Farm Animals in Britain.** *Lab. Practice.* London. 1958, June, v. 7, No. 6, 353–5. [10 refs.]

This paper describes clearly methods for determining quantitatively the presence of helminth eggs and protozoal cysts in the faeces of animals, many of which are reservoirs of human infections. Four stages are carried out on 3 gm. of faeces, broken up by glass beads, and subjected to centrifugation and flotation with saturated sodium chloride or zinc sulphate solution. Consistent results are obtained with most parasites, and in particular with *Ascaris*, *Strongyloides*, *Fasciola*, *Balantidium*, *Isospora* and *Eimeria*. *P. C. C. Garnham*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

MCMILLAN, H. L. **Study of a naturally occurring Population Intermediate between** *Culex p. pipiens* **and** *C. p. quinquefasciatus.* *Amer. J. Trop. Med. & Hyg.* 1958, Sept., v. 7, No. 5, 505–11, 6 figs.

The study in question was carried out in Lawrence, Kansas.

It was found that until early July the local *Culex pipiens pipiens* population consisted mainly of the typical sub-species, intermediates of *C. p. pipiens* and *C. p. quinquefasciatus* [*fatigans*] being uncommon. As the season progressed intermediates became increasingly common and eventually forms resembling *C. p. quinquefasciatus* appeared. This may have been due to an influx of *C. p. quinquefasciatus* from the south. Unknown factors, inimical to the types resembling *C. p. quinquefasciatus* and the intermediate types seem to be present by the autumn, as their numbers fall; another factor operating against their persistence until the next breeding season is their inability to overwinter in the region studied. A similar trend was observed in laboratory colonies. *E. R. Nye*

ROZEBOOM, L. E. **Hybridization of** *Culex pipiens fatigans* **Wiedemann from the Philippine Islands with American Strains of the** *Culex pipiens* **Group (Diptera: Culicidae).** *Amer. J. Trop. Med. & Hyg.* 1958, Sept., v. 7, No. 5, 526–30.

Interfertility was demonstrated experimentally between the Philippine Islands *Culex fatigans* and the North American strains of *C. pipiens pipiens*, *C. p. fatigans* and *C. p. molestus*. Survival rates of hybrid larvae and pupae were comparable to those of the parent strains. F_1 hybrids produced vigorous F_2 and backcross colonies.

The author concludes that *C. fatigans* from the Philippines (Luzon) is conspecific with the North American *C. pipiens*, *molestus* and *fatigans*.

E. R. Nye

CAPONE BRAGA, P. Sulla letalità larvale in ceppi di *Culex molestus* Forskal. [**Larval Mortality in Strains of** *Culex pipiens molestus*] *Riv. di Parassit.* Rome. 1958, July, v. 19, No. 3, 225–8.

The general characteristics of *Culex pipiens* races are outlined [see MATTINGLY *et al.*, this *Bulletin*, 1952, v. 49, 651]. Both the *pipiens pipiens* and the *p. molestus* form breed in Italy [LA FACE, *ibid.*, 1958, v. 55, 828] and are believed to interbreed in nature.

The author refers to Roubaud's observation of partial genetical incompatibility between the two strains. He suggests that wild caught specimens should show some signs of partial infertility due to previous interbreeding. To test this, two laboratory strains were started from wild sources; one from a well and one from a ditch containing slaked lime. These were inbred for 10 generations. The author found evidence of infertility in the form of "blocked" eggs (which do not complete embryonic development) and in undue larval mortality. This was evinced, not in the first generations, but in the 3rd or 4th onwards. Further tests are in progress in crossing these two strains.

J. R. Busvine

HAMON, J., EYRAUD, M., SALES, S. & ADAM, J. P. Observations sur le niveau de sensibilité au DDT, au dieldrin et au HCH de *Culex pipiens* ssp. *fatigans* dans la région de Bobo-Dioulasso, Haute-Volta, Afrique Occidentale Française. [**Observations on the Level of Susceptibility of** *Culex pipiens fatigans* **to DDT, Dieldrin and BHC in the Bobo-Dioulasso Area, French West Africa**] *Bull. Soc. Path Exot.* 1958, May–June, v. 51, No. 3, 393–404. [17 refs.]

The WHO adult and larval tests have been used to investigate the level of susceptibility to DDT, dieldrin and BHC of *Culex pipiens fatigans* in and around the town of Bobo Dioulasso, French West Africa. Test insects collected from Bobo-Dioulasso (treated more or less regularly with DDT for 6 years) were compared with those from the nearby village of

Pala (treated with dieldrin wettable powders since 1955 but never with DDT) and from Karankasso, an untreated village.

In each case a very high adult resistance to DDT was demonstrated. In Karankasso and Pala this was apparently quite unrelated to the selective action of DDT. In contrast the larvae were very susceptible to DDT with an LD50 of about 0·02 p.p.m. Adult resistance to dieldrin in Pala was very high. Larval resistance was slight. Larvae of this strain were slightly more resistant to BHC than to dieldrin.

It is observed that the levels of susceptibility of these three strains are not always of the same order as those found under similar conditions in Asia. *R. J. Wood*

Hayes, R. O., Bellamy, R. E., Reeves, W. C. & Willis, M. J. **Comparison of Four Sampling Methods for Measurement of** *Culex tarsalis* **Adult Populations.** *Mosquito News.* 1958, Sept., v. 18, No. 3, 218–27, 1 fig.

"Four methods of collecting adult *Culex tarsalis* were compared through a period of more than a year at three localities in Kern County, California. The collections were made by: aspirator in natural shelters, aspirator in one-cubic-foot red box artificial shelters, mosquito light traps, and dry ice (CO_2) baited traps.

"All methods proved satisfactory for measuring the abundance of adult female *C. tarsalis* in the summer. All methods except bait traps adequately sampled male *C. tarsalis*. There was close agreement between the population trends indicated by the different collecting methods within single areas and by each collecting method in the three localities.

"Each of the four sampling methods has advantages and limitations for *C. tarsalis* population measurement depending on whether the application is to mosquito control, epidemiological or biological studies."

Mattingly, P. F. **Lectotypes of Mosquitoes (Diptera: Culicidae) in the British Museum. Part III. Genera** *Sabethes*, *Udaya* **and** *Aëdes* **(Subgenera** *Paraëdes*, *Cancraëdes* **and** *Skusea***).** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1958, Aug. 29, v. 27, Pts. 7/8, 105–8. [13 refs.]

Sautet, J., Aldighieri, R. & Aldighieri, J. Résistance artificiellement accrue au DDT des adultes d'*Aedes aegypti*, par contact des larves à l'insecticide. [**Resistance to DDT developing artificially in Adults of** *Aëdes aegypti* **as a Result of Contact of the Larvae with Insecticide**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 332–4, 1 fig.

The authors demonstrate the rapidity with which fourth stage larvae of a very susceptible strain of *Aëdes aegypti* (Bobo-Dioulasso) can be rendered relatively resistant by laboratory selection.

20 fourth stage larvae were placed in small earthenware pots 8 cm. in diameter and containing 103 cc. of clean water. To each pot was added a variable number of drops of a solution of Neocide 50 (wettable powder) [DDT] diluted in such a manner as to give 0·01 mgm. Neocide 50 per drop of solution. The surviving pupae were washed and placed in tubes where they emerged. The resulting adults were put in contact with DDT by the Petri dish technique [see below].

It was shown that a single contact of the larvae with the insecticide caused the adults coming from the surviving larvae to have an increased resistance. The quantity of Neocide 50 did not seem of very great importance. The duration of contact of the adult appeared somewhat more important.

It was concluded that resistance in the field was likely to develop more readily if larval control programmes were incompletely implemented. Such a practice would allow the spread of some adults which could become the origin of a resistant line or at least one with a lessened sensitivity. *R. J. Wood*

SAUTET, J., ALDIGHIERI, R., ALDIGHIERI, J. & ARNAUD, G. Comparaison de la sensibilité au D.D.T. des adultes de plusieurs souches d'*Aedes aegypti*. [**Comparison of Susceptibility to DDT of Adults of Several Strains of** *Aëdes aegypti*] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 404–12, 5 figs. & 6 graphs.

In a previous investigation the authors demonstrated a high level of larval resistance to DDT in strains of *Aëdes aegypti* (*Bull. Soc. Path. Exot.*, 1956, v. 49, 333).

The present study is concerned with adult mosquitoes of 4 strains: from Haiti, Trinidad, Tahiti and Bobo-Dioulasso (Upper Volta, French West Africa). Individual adults have been exposed for from 3 to 30 minutes to deposits of 0·2 mgm. DDT per sq. cm., or to powdered DDT crystals, in glass Petri dishes. On succeeding days the mortality was assessed. The technique is described in detail.

It was demonstrated that, in comparison with the previous experiments, the susceptibility of the adults was, in its broad outline, very much the same as for larvae of the same strains. The effect of DDT on the different strains varied greatly. The Bobo-Dioulasso and Tahiti strains were both susceptible, the Bobo-Dioulasso especially so. The Haiti was more resistant than the Trinidad. Males and females showed a very similar degree of resistance provided the duration of contact was prolonged. The death rate was not greatly affected by the time of contact with the deposits.

The freshness of the deposit (8 days to 5 months) had no very great influence on the death rate of the susceptible strains. On the contrary, the death rate among the resistants varied greatly with the age of the

deposit; a marked and sufficiently rapid mortality was only obtained with fresh deposits. *R. J. Wood*

See also p. 342, BONNET & CHAPMAN, **The Larval Habitats of** *Aedes polynesiensis* **Marks in Tahiti and Methods of Control.**

CORBET, P. S. **Identification of Adult** *Mansonia* (*Coquillettidia*) *pseudoconopas* **Theobald and** *M.* (*C.*) *maculipennis* **Theobald (Diptera: Culicidae).** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1958, Aug. 29, v. 27, Pts. 7/8, 127–8, 2 figs.

HADDOW, A. J. & GILLETT, J. D. **Laboratory Observations on the Oviposition-Cycle in the Mosquito** *Taeniorhynchus* (*Coquillettidia*) *fuscopennatus* **Theobald.** *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 320–25, 2 figs. [16 refs.]

Oviposition in *Taeniorhynchus* (= *Mansonia*) *fuscopennatus* takes place almost exclusively at night, about 7 days after the blood meal. Only 4 out of 104 egg rafts were laid during the day. The oviposition cycle at night showed a small peak of activity early in the night, and a major peak before sunrise. Most egg rafts (42%) were laid in the three-hour period before sunrise. The biting cycle in the field showed a main peak of activity just after sunset, and a smaller peak just before sunrise. It is suggested that the two cycles are linked, and that the small biting peak, before sunrise, represents females that have laid during the night and which have been able to return to the feeding grounds; and that the main peak of biting, just after sunset, contains most females that oviposited just before sunrise, and which have been inhibited from feeding during the day. Recognizably parous females, containing relict eggs, were found to form a constant proportion (6·4–7·8%) of the females biting through the night. Only 16% of 200 females which had laid egg rafts contained relict eggs, so that the number of parous females biting at night may have been from 40 to 48% of the total biting population. *B. R. Laurence*

MICKS, D. W. & SINGH, K. R. P. **Infrared Spectra of Acetone Extracts of Susceptible and Insecticide Resistant Strains of House Flies.** *Texas Reports on Biol. & Med.* 1958, v. 16, No. 3, 355–62, 3 figs.

Infra-red absorption spectra have been successfully used to distinguish between strains and species of mosquitoes [this *Bulletin*, 1954, v. 51, 648; 1955, v. 52, 97]. In this paper a similar technique, described in some detail, is applied in a study of acetone extracts of susceptible and insecticide-resistant strains of house-flies, *Musca domestica*. 7 strains

were used: 1 susceptible and 6 resistant to Dilan, Lindane, dieldrin, DDT and dieldrin, malathion, and DDT respectively.

The most informative range of the spectrum fell between 2μ to 10μ. The " maximum differentiation could be obtained by comparing the shape and depth of the shallow band from $2{\cdot}7\mu$ to about $3{\cdot}1\mu$ and the shape of the broad band from $7{\cdot}8\mu$ to 10μ, particularly that portion with a maximum at $8{\cdot}6\mu$ ". Differences between strains as to their absorption in the latter region can be partly explained by the presence of specific lipids.

The results indicate that although certain strains may be distinguished by their infra-red spectra, these differences do not appear to be linked with resistance *per se*. It is planned to extend this investigation.

R. J. Wood

HANSENS, E. J. **House Fly Resistance to Diazinon.** *J. Econom. Entom.* 1958, Aug., v. 51, No. 4, 497–9.

Flies were collected from 5 barns on dairy farms in New Jersey. Each barn had a different history of insecticide treatment but all had been sprayed with 0·5 or 1·0% Diazinon for at least 2 years. The flies were exposed for 5–15 minutes on plywood panels treated with an even deposit of 1·0 mgm. Diazinon per square inch. A period of 24 hours was allowed for recovery before mortality counts were made.

When compared with a laboratory colony, all 4 strains collected in the field showed some degree of resistance, with the level proportional to the number of applications of Diazinon. The highest level was found where the greatest amount of the insecticide had been sprayed, *i.e.*, 8 sprays of 1% Diazinon over a period of 5 years.

Laboratory selection for a higher degree of resistance was carried out successfully. In as few as 3 generations there was a noticeable increase in resistance.

A cross-resistance was shown to 11 other insecticides including both dieldrin and DDT as well as other chlorinated hydrocarbons and organophosphorus compounds.

R. J. Wood

FLYNN, A. D. & EDEN, W. G. **Systemic Insecticidal Action on Blood-sucking Ectoparasites of Several Compounds administered orally to Rabbits.** *J. Econom. Entom.* 1958, Aug., v. 51, No. 4, 499–501.

Dow ET-57, administered orally in doses of about 100 mgm./kgm. of body weight, has been used with success against *Hypoderma* infections in cattle, and has also been shown to be successful against *Callitroga* and *Stomoxys* when given orally or subcutaneously, 100 mgm./kgm., to guineapigs. The search for further compounds that show systemic insecticidal activity in animals is reported on here. The relative toxicity to

rabbits of 28 compounds was first tested by estimating the highest sublethal, and the lowest lethal, dose in mgm./kgm. of body weight. The insecticides were given through a stomach tube, in their acetone or water solutions, or in acetone-water emulsions, at a concentration of 100 mgm./cc. Adult *Stomoxys*, *Aëdes aegypti*, fifth instar nymphs of *Cimex* and *Amblyomma maculatum* nymphs were fed on rabbits treated with the highest sublethal dose. Treatment with Bayer 19596, Bayer 13242 and Bayer 17364, at doses of 625, 25 and 7 mgm./kgm., resulted in 100% mortality in *Cimex* in 24 hours. Bayer 19994 and Bayer 18613, at doses of 25 and 1100 mgm./kgm., produced a 90% mortality in *Cimex* after 6 days.

None of these 5 chemicals showed any action against *Aëdes* or *Amblyomma*, although there were indications that they were active against *Stomoxys*, but these results were inconclusive. *B. R. Laurence*

WALTON, G. A. *Argas persicus* **(Oken 1818), (Argasidae Ixodoidea) in Tanganyika Territory.** *East African Med. J.* 1958, Oct., v. 35, No. 10, 573–4.

73 specimens of *Argas persicus* were collected from a tree [*Ficus* sp.] felled in the grounds of a hospital in Ngudu, in the Lake Province of Tanganyika. The tree had been a roosting place of the grey heron [*Ardea cinerea*]. This may be the first record of this species from Tanganyika.

A. persicus is found on birds and domestic poultry and has been found in Kenya and Uganda, but rarely, in the author's experience, in African dwellings in Kenya and Tanganyika. Apart from the record quoted he has found it only 4 times in a search of 4,750 widely distributed huts and not at all in 510 huts in Sukumaland, in the Lake Province (100 of them being in the Kwimba District where Ngudu is situated).

In the Teita Hills, Kenya, in 1950, heavy infestations were found in 4 African huts in an area of high temperature and low humidity at about 2,500 feet above sea-level. 4 of 74 huts were found infested at a level below 3,500 feet and none of 333 above that height. *Ornithodorus moubata* is common above that altitude, but very rare in the lower altitudes where *A. persicus* was discovered.

Two of the infested huts, typical mud and wattle round structures with thatched roofs, were in a village at the base of Mbololo Hill. *A. persicus* in all its stages was found in crevices in the rough mud inner walls (mean temperature 80°F., RH 65%). Precipitin tests from 5 specimens showed that they had fed on fowls.

The other 2 heavily infested huts were in a village at the entrance to the Mbale valley. They were poorly constructed, and ticks were again found in crevices in the inner walls. All the domestic fowls in these huts had died and the local people stated that they were themselves sometimes bitten by *A. persicus*. *H. J. O'D. Burke-Gaffney*

BLUM, M. S. & PRATT, J. J., Jr. **Relationships between Structure and Synergistic Activity of some Structural Analogs of DDT.** *J. Econom. Entom.* 1958, Oct., v. 51, No. 5, 647–50. [15 refs.]

MISCELLANEOUS PAPERS

MANSON-BAHR, P. **The Practice of Tropical Medicine from the Consultant's Chair.** *Central African J. of Med.* 1958, Aug., v. 4, No. 8, 330–39.

Sir Philip Manson-Bahr heads this paper of reminiscences with a wise quotation from MANSON:—"Most mistakes in medicine occur, *not* from not knowing, but from not looking". This is true, but the reviewer would add that there is also the importance of the indefinable clinical sense which enables its possessor to add an intuitive element to his reasoning and experience. The author in this paper draws upon his long acquaintance with all forms of disease which may present themselves in people who have lived in the tropics, and it is evident, though not stated, that he himself possesses this clinical sense in marked degree. The short accounts that he gives of amoebiasis and bacillary dysentery in their varied forms will be valuable to those who deal with bowel complaints, and they will benefit from the histories of selected patients, told with the author's usual verve. These histories illustrate the truth that vigilance is the doctor's chief virtue, and that it is hard to sustain.

The final stories are told with humour, and the whole paper is exciting and valuable, and should be read by all practitioners of tropical medicine.

Charles Wilcocks.

WRIGHT, J. **Education for the Tropics.** *Lancet.* 1958, Aug. 30, 453–6.

The author recently served as medical officer to the Methodist Mission Hospital, Ilesha, Western Nigeria, and his argument is that medicine in the tropics is very different from medicine as we know it in Britain. "Such conditions, for example, as pulmonary tuberculosis, toxaemia of pregnancy, intussusception, measles, and peptic ulcer are simply not the diseases that we know by those names." "The education of the doctors must be redesigned to develop new attitudes not relevant to European medical practice." They should be given something of the economic, social and cultural setting in which they are to practise.

The author makes suggestions. A newly qualified houseman could do one year's internship in a tropical teaching hospital, but this would affect only a few, because the capacity of these hospitals is limited. Alternatively, a course in medicine as practised in the tropics (rather than tropical medicine) could be provided for those intending to practise abroad, and an exchange system could be started for senior clinicians. The importance

of paediatrics is so great that some post-graduate training in the subject should be provided for every doctor who seriously intends to practise in the tropics.

Mass programmes of immunization, suppressives, injections, free milk, insecticidal spraying, etc., are invaluable, but they are obviously not enough. "The basic problems of health are still largely social, to be solved at community, rather than at mass, levels; and to be solved by doctors whose training is not only sufficiently catholic for the task but is also designed to develop the highest levels of adaptability."

[This is an important article, though the first part is somewhat confused by a cricketing metaphor used excessively; but the thesis is sound enough.] *Charles Wilcocks*

LONGMORE, L. **Medicine, Magic and Witchcraft among Urban Africans on the Witwatersrand.** *Central African J. of Med.* 1958, June, v. 4, No. 6, 242–9, 2 figs.

Miss Longmore writes from the Department of Bantu Studies, University of Witwatersrand, and the first point she makes is that the African believes that his environment is as capable of controlling him as he is of controlling it, and that objects inferior to himself are capable of destroying his existence—vegetation, birds, beasts and anything else can be used by his foes for his destruction. Belief in medicine is strong, but ancestral spirits control its power, and the customs relating to these spirits must be fully observed. African doctors obey definite traditional "laws" which insist that they must be incorruptible and must never supply medicines to harm other people, and in this they differ from the diviners or "witch-doctors" who work in secret and believe that man can control supernatural forces for his own benefit, and who therefore implicitly deny the existence of an impersonal order governed by natural laws. This belief in magic and witchcraft is integral to African cultures, and to some Africans the European law against the imputation of witchcraft is the cause of increasing ill-health.

This is the background, and the author describes the procedures dictated by it. The beliefs are very strong and cannot be dismissed as unimportant. There is evidence that some Europeans have much faith in the efficacy of African medicines. *Charles Wilcocks*

MARGETTS, E. L. **The Psychiatric Examination of Native African Patients.** *Med. Proc.* Johannesburg. 1958, Oct. 4, v. 4, No. 20, 679–83.

This article is based on the author's experience in Kenya. Obtaining an adequate history from a mentally ill African is especially difficult for a non-African psychiatrist. The language difficulty immediately arises as the patient is usually familiar only with his own tribal language and

that is often deficient in descriptive terms. The identification of a patient whose name is subject to change, the age unknown and place of residence not fixed, also is a problem. Helpful data in assessing age are the size and general appearance, teeth, breast and genital development, circumcision age-group, remembrance of known events, the number and size of children and documents in connexion with registration. Past history is often vague. An assessment of the degree of detribalization is important. In investigating the family history it is to be appreciated that the word used for "brother" usually has a wide and loose meaning. Enquiries should be made as to previous criminal convictions especially for arson, a frequent activity among psychotic African patients. Evidence as to past organic cerebral illness is important. The author considers that malaria has been overrated as a cause of psychosis except when it causes a toxic psychosis or is true cerebral malaria. The consumption of alcohol is responsible for much short-lived mania; other drugs to which addiction is common are *Cannabis sativa indica* (*Bhangi*) and *Catha edulis* (*miraa*), while *Datura stramonium* is used on occasion.

The author finds the mental illnesses diagnosable according to Western text-book standards although the secondary psychopathology and symptoms differ according to the tribal background and degree of detribalization. Objective examination requires an adequate knowledge and experience of general medical disorders in Africans, and allowance for tribal customs, including circumcision rites in both male and female and the practices of witch doctors, has to be made in interpreting the significance of scars. Subjective manifestations show certain differences of emphasis from those of sophisticated people. Depression is not usually appreciated as such although the author believes it to be more frequent than has been supposed and suicide may result. The "voices" which Africans hear are usually attributed by them to God or dead relatives. Most paranoid psychotics have simple delusions of grievances such as that someone is trying to steal their land but, in this state, they rarely exhibit any race hostility.

[The author is following in the footsteps of Carothers (*Bull. Hyg.*, 1948, v. 23, 334; 1952, v. 27, 340; 1954, v. 29, 281). For the experience of an African psychiatrist see Lambo (*ibid.*, 1957, v. 32, 451).]

F. J. Wright

REPORTS AND SURVEYS

Congo Belge. Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge. Status et arrêtés d'exécution. [**The Queen Elisabeth Fund for Medical Assistance to the Indigenous People of the Belgian Congo [FOREAMI]. Statutes and Regulations**] 42 pp. [Also in Flemish.] [? 1958.] Brussels: 14, Square de Meeûs.

In this document there are reprinted all the basic statutes and regulations which govern FOREAMI, the experimental and developmental medical project in a part of the Belgian Congo. It thus consists of a series of legal documents which between them describe the statutory standing of the organization, its various officers and divisions, its sources of income and its rights and authorities in expenditure of income and accounting for it. A collated series of this kind is clearly invaluable for the internal working of the scheme and will be of interest to others with a concern in the organization of similar schemes. *G. Macdonald*

LEARMONTH, A. T. A. **Medical Geography in Indo-Pakistan—a Study of Twenty Years' Data for the Former British India.** *Indian Geographical J.* 1958, Jan.–Mar. & Apr.–June, v. 33, Nos. 1/2, 1–59, 19 figs. [Numerous refs.]

The author continues his previous successful experiment in medical cartography [see this *Bulletin*, 1955, v. 52, 535] by producing annotated maps showing for the Indo-Pakistan area the range and variability of birth rates, death rates, infant mortality rates and mortality from fevers, respiratory diseases, cholera, dysentery, plague and smallpox. These maps all follow the pattern previously developed and give a good impression of the distribution of severity and of variability of the disease which is a material help in understanding the epidemiology and the impact on the population.

These standard maps are amplified by other cartographic material, notably reprints of maps of the prevalence of malaria, the distribution of anopheline mosquitoes and of the main intestinal helminths. Descriptive matter supplements the cartographic material with varying emphasis in different sections, it being considered necessary for instance in the section on malaria to describe briefly the parasites and their cycles of development and transmission while less material is given in others.

The pictures presented are undoubtedly informative and bring out geographical differences, some of which had not been previously appreciated by the abstracter. A summarizing map shows the broad regional differences in health and disease, bringing out the relatively great importance of respiratory diseases in the northern plains, of intestinal diseases in the south and east and the main regions of high mortality. It is followed by a cartographic and written review of the calorific and protein content of diets in different groups of the population, the community projects now being undertaken to ameliorate the conditions and the areas which have been under malaria control in the present National Programme. [This paper is an important addition to the difficult but interesting subject of medical cartography.] *G. Macdonald*

SEHGAL, B. S. & DATTA, S. P. **Health Survey of School Children in Ganjar (Dist. Sitapur U.P.).** *Indian J. Pub. Health.* 1957, Oct., v. 1, No. 4, 246–9, 1 map & 2 graphs.

"476 children were examined representing the entire Ganjar schools, to find out its health problem because of its peculiar topographical features.

"(1) The children were found better in height and weight than Singur (West Bengal) children.

"(2) 60% of children examined were vegetarians.

"(3) Average consumption of milk was 6·3 ozs./child.

"(4) The commonest deficiency diseases noticed were dental caries, goitre, xerosis and rickets.

"(5) The commonest disease prevalent at the time of inspection was trachoma and intestinal diseases.

"(6) No disease peculiar to the environment except goitre was noticed."

POLUNIN, I., with gynaecological investigations by Mary SAUNDERS. **Infertility and Depopulation. A Study of the Murut Tribes of North Borneo.** *Lancet.* 1958, Nov. 8, 1005–8, 2 figs. [14 refs.]

The Muruts who inhabit the interior of North Borneo and parts of Indonesian Borneo, live in remote and isolated areas and have only recently given up head-hunting. For some decades it has been known that they were declining in numbers and this was ascribed to various causes by different workers [this *Bulletin*, 1935, v. 32, 733]. Between the censuses of 1931 and 1951 the Muruts had suffered a natural decrease of 23%, and this prompted the investigation reported here.

An initial survey showed a disease load and general mortality rate no higher than in many other primitive groups [see POLUNIN, this *Bulletin*, 1954, v. 51, 1013], but only 36·5% were estimated to be younger than 20 years. Among Murut women who had married 40% said they had no live births, while among other tribal groups less than 5% were childless. These results suggested infertility, and an examination was made of 27 Murut women with their 25 husbands, 10 women from the interior and 23 women from a neighbouring tribe. More than half the Murut women had been married for more than 10 years. Infertility was not apparently due to consanguinity in marriage or anti-natal practices.

Of 27 Murut women 15 gave histories of 19 pregnancies which resulted in only 7 live births. Of 60 women examined 41 had evidence of old pelvic infection with blocking of the fallopian tubes in the majority. Pelvic infection was noted in 88% of women with a history of pregnancy, but in only 44% of those with no such history. Among those with no sign of pelvic infection only 19% had a history of pregnancy. These figures indicated that pelvic infection was more common in those who

had been pregnant. A history of post-abortion or puerpural fever was common and it is believed that infection following pregnancy is the most common cause of infertility in the Muruts. Among some Murut tribes vaginal examinations are made during labour, and the placenta is removed manually. Furthermore, after delivery the mother sits in one place for 4 days and nights, urine and faeces being voided through the slatted floor. Murut women have started wearing underpants which are rarely washed and may promote pelvic infection. Venereal disease does not affect the birth rate markedly. The mortality of children common in other primitive populations is a serious matter among Muruts when coupled with infertility.

Medical care of the Muruts is difficult because of their inaccessibility and low population density but a malaria campaign is under way. The dispensaries in their areas do not deal with maternal and child health but Murut women who act as midwives are being trained in cleanliness and non-interference.

T. H. Davey

BOOK REVIEWS

AJOSE, Oladele A. [M.D., D.P.H.] **Public Health in Tropical Countries.** pp. vii + 191, 25 figs. 1958. London: J. & A. Churchill Ltd., 104, Gloucester Place, W. 1. [18s.]

The author of a text-book on this extensive subject, intended as the present one is for an undergraduate audience, is inevitably faced with great difficulties of choice of content. Professor Ajose solves this problem in relation to the audience he teaches, which gains in its classes and clinical work a sufficient understanding of the priorities and importance to be attached to different programmes and of the methods of approach to the people, and is able to see the great contributions of WHO and UNICEF to the control of malaria, yaws and other tropical plagues. The main requirement in addition to this background is a technological outline of the methods used in water collection, conservation and purification in town and country circumstances, in the disposal of waste matters and in ensuring the inspection and clean handling of food.

A lengthy chapter deals seriatim with various communicable and infectious diseases giving for each the main points about aetiology, transmission, immunity and methods of control. The book contains briefer material on a number of other matters, the organization of maternity and child welfare services and disinfection. It closes with chapters on helminth infections, insects of medical importance and vital statistics. It is written in a lively manner with reference to African conditions, is well produced and illustrated and has a good index, all of these helping to make it a useful book for the purpose for which it is intended.

G. Macdonald

VAN RIEL, J. **Hygiène tropicale.** [Tropical Hygiene] Préface du A. DUBOIS. 213 pp. 1958. Liége: Sté Ame Desoer, 21, Rue Sainte-Véronique, Belgium.

There are very few books dealing systematically with tropical hygiene and therefore the publication of a text-book on this subject is an event. Public health doctors in the tropics will welcome this short volume from Belgium, written by one who had considerable experience in the Belgian Congo as head of the medical service in a mining community, and now holds a Chair in Brussels University and in the Institute of Tropical Medicine at Anvers. This book consists of text alone, unrelieved by the diagrams and figures which illustrated the spoken lectures on which it is based. There is a brief preface by Professor A. Dubois.

The book is divided into two almost equal parts. The first deals with hygiene in eight chapters concerned respectively with the tropical environment, housing, nutrition, water supplies, vital statistics, public health and medical social organization in under-developed countries, industrial hygiene and personal hygiene. These subjects are covered as thoroughly as space allows. The longest chapter, that on nutrition, occupies only some 25 pages but provides an adequate account. A valuable feature of the hygiene section is the emphasis on the social and economic background to the health problems of under-developed countries and the need for a change in outlook on the part of the doctor trained in the temperate zone. The chapter on industrial medicine is concerned with the health problems of industries in the tropics, mining in particular, and it includes much interesting information about practice in the Belgian Congo in regard to selection of recruits, the process of conditioning them to regular employment, and the environmental conditions which should be provided by the employer for the employee and his family.

The second half of the book deals with the epidemiology and control of disease. Two chapters are concerned with general principles and the remaining five chapters discuss specific diseases, grouped into five categories according to their main mode of transmission, namely, diseases transmitted by immediate contact, droplet and airborne infections, intestinal infections, diseases spread by invertebrate hosts, and zoonoses. The diseases dealt with are almost all confined to those occurring in Belgian Congo, though some which do not occur but constitute a threat, such as cholera, receive adequate treatment, while others such as Q and undulant fevers, which have little known prevalence there, are dismissed with a brief mention. The sections dealing with specific diseases are compressed into some 60 pages and this brevity entails cursory treatment. There is no index, but the book ends with a detailed table of contents referring almost to every page, which can be used for reference.

The author makes clear in his foreword that this book is not intended for doctors but was written as a text-book for subordinate staff in health, dispensary and midwifery services and for non-medical Europeans going

to Belgian Congo. Readers in these categories will find the general principles of hygiene and of epidemiology and control of disease in the tropics clearly and concisely expounded and they will not need to know the details. The book will prove valuable to those responsible for teaching tropical hygiene to professional or sub-professional students, since it provides an excellent systematic coverage of the subject, but if it were to be used as the basis for a course of lectures all the material to illustrate them would have to be provided. *T. H. Davey*

PESSÔA, Samuel Barnsley. **Parasitologia médica.** [Medical Parasitology] 5th Edition revised. 1124 pp. 567 figs. 1958. Rio de Janeiro: Livraria Editôra Guanabara, Koogan S.A., Rua do Ouvidor, 132.

The appearance of a new edition only 4 years after the publication of the 4th edition of this treatise by the eminent Brazilian parasitologist is good evidence of its undiminished popularity among Portuguese-reading parasitologists and medical workers. The contents of this work were dealt with in great detail in a comprehensive review of the previous edition [this *Bulletin*, 1954, v. 51, 1126] and need not be repeated here. Suffice it to say that in the 5th edition the subject matter (which includes protozoology, helminthology, entomology, and parasitological technique) has been brought up to date and revised, with the result that the volume of the book has increased by some hundred pages.

Foreign readers will appreciate in particular the detailed account given of those parasites and diseases which are peculiar to the New World, such as American leishmaniases and trypanosomiases. *C. A. Hoare*

SQUIRES, H. C. [C.M.G., D.M., F.R.C.P., D.P.H.] **The Sudan Medical Service. An Experiment in Social Medicine.** Foreword by Ali BEDRI, M.B.E., F.R.C.P. pp. xii + 138, frontispiece & 7 pls. 1958. London: William Heinemann Medical Books Ltd., 99, Great Russell Street, W.C.1. [15s.]

The Sudan Medical Service came into being in 1904, and was taken over by the Sudanese administration in 1956, along with all other government institutions. It begun largely as a British organization, though in the early days there were many Syrian medical officers, but by 1951 116 Sudanese doctors had qualified from the Kitchener School of Medicine, founded in 1924. In the foreword to this book Dr. Ali BEDRI, M.B.E., F.R.C.P., Minister of Health, 1948–52, remarks: "When it fell to my colleagues and myself in 1949 to put into operation a ten-year plan for the consolidation and expansion of the Health

Services we found that we had a firm foundation on which to build. . . ." He also states, in speaking of Sir Eric Pridie, that "One of the outstanding features of his policy as Director was his indefatigable efforts to effect an early Sudanisation of the senior posts in the Service".

The book gives a brief outline of the history of this Service, and it also reflects the personal experience of the author, who joined in 1908 and retired in 1930. In the early days the Sudan was as hazardous a country as any for British doctors, and a quotation from a 1923 report on the district of Tembura reflects the conditions existing at that time:—"The words 'continual change in the medical staff' should have been qualified by the statement that the first Senior Medical Officer left the district worn out in mind and body and quite unfit to return: the second died three days after reaching Tembura: the third had his health permanently impaired through an attack of blackwater fever and the fourth left the district suffering from repeated attacks of malaria at short intervals."

Much of the book is occupied with accounts of the epidemics—sleeping sickness, cerebrospinal fever, etc.—and the endemic diseases, and in these sections, as elsewhere, the names of the various medical officers are given, with short accounts of the work they did. One of these is particularly interesting: sleeping sickness in the south was tackled by the provision of cleared settlements where the people could live untroubled by tsetse flies, and this involved cooperative work on a large scale, in which the habits of the people were transformed. "They were no longer afraid of the white man. Some had come out of the forest to become craftsmen, carpenters, builders and blacksmiths. All had learned to obey laws. Superstitions waned, agriculture prospered. The task of extirpating disease had profoundly affected the life of a people."

Special chapters are included on the two great wars and their effects, and the periods of expansion which followed them, on the training schemes for all grades of medical personnel, on the Wellcome and Stack Laboratories, and on other features of medical life. There is an index of names, and the book is illustrated with a few photographs of medical buildings.

There has never been any doubt that the Sudan Medical Service is a proud and efficient service, whose reputation from the first attracted men of high intelligence, to serve the people among whom they lived with skill and devotion. The record contains many famous names, and the book gives the reader an impression of the work and its setting which is of some value; the general tone is a mixture of personal recollection and short statement of fact, with here and there a burst of enthusiasm for a person. The reviewer, however, is left with the feeling that this should be regarded as a first brief account of a great subject, and that there is still room for a much longer and more profound history of a magnificent effort.

Charles Wilcocks

ANNEX 8. WORLD TOTALS

Area	Population Millions	Number of medical schools	Number of physicians	Annual number of medical graduates	Population per medical school Millions	Population per physician	Annual number of medical graduates per 1,000 physicians	Population per new physician, *i.e.*, annual graduate Thousands
Africa	210·8	16	23,284	1,089	13·2	9,055	46·8	194
North and Central America ...	234·3	124	259,664	9,076	1·9	902	35·0	26
South America	121·0	53	48,263	5,308	2·3	2,507	110·0	23
Asia, Eastern	1,370·8	171	209,688	12,418	8·0	6,537	59·2	110
Asia, Western	82·5	15	16,951	868	5·6	4,869	51·0	95
Europe	619·7	253	665,522	37,222	2·4	931	55·8	17
Oceania	14·2	6	12,427	741	2·4	1,145	59·6	19
World total	2,653·4	638	1,235,799	66,722	4·2	2,147	54·0	40

World Health Organization. **World Directory of Medical Schools.** 314 pp., 1 folding map. 1957. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [25s.; $5.00; Sw. fr. 15.–.]

[This review appears also in the *Bulletin of Hygiene*, 1959, v. 34, Mar.]

The text of the Directory builds up to a summary in which the most significant figures are perhaps the population per physician, indicating the present condition, and the population per new physician, indicating the relationship of output to the needs of the countries. An original explanation with a summary of curricula gives such information as can be collected on medical education in the different countries of the world. There follows for each country, listed alphabetically, a written statement of variable but often considerable length dealing with the administration of medical education, the methods of school education, the conditions of admission to medical school with details of the curriculum, examinations, standards and methods of qualification or registration. There is a list of medical schools in the territory giving for each the ownership, the year of foundation, the numbers of teaching staff, of enrolled students, annual admissions, annual graduates, and the tuition fees. Not all of this material is of course strictly comparable from country to country, but an effort has been made to make a comparison of like with like. There is considerable interest in the individual statements and also in the summaries of information given in a series of annexes for the different continental areas, from which it is possible to amplify the outline information derived from the table which is reprinted on p. 382. All the countries of Africa except the Union of South Africa, Egypt and Algeria have either more than 5,000 population per physician, or more than 100,000 population per new physician, or both, whereas in none of the countries of South America is this the case, though a few central American countries are still below this arbitrary standard chosen by the reviewer. In eastern Asia only Japan, Hong Kong, the Philippines and Taiwan meet such a standard while most of the countries fall considerably below it, some of their deficiencies being greater than those typical of Africa. In western Asia the situation is much more satisfactory and though few countries meet the standard, most approach it. Albania is the only country of Europe in which there appears by this form of measure to be remaining gross deficiency of medical practitioners, while in Oceania it is in New Guinea only that a similar defect exists. [This Directory should be on the bookshelf of all who are concerned with the standards and volume of medical education throughout the world, and also all who receive students from overseas countries.]

[For review of the first edition, see *Bull. Hyg.*, 1953, v. 28, 998.]

G. Macdonald

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